

Mining

CONGRESS JOURNAL



JUNE
1955



COAL CONVENTION REPORT NUMBER

Bucyrus-Erie 88-B Shovel Design

Increases Digging Power, Digging Speed, Digging Life

For sustained high output in heavy-duty service, here's an excavator that will meet your demands fully — the Bucyrus-Erie 4-cu. yd. 88-B. Three important advantages contribute to the 88-B's high production performance: superior quality construction that stands up under digging stresses; front-end design that applies power efficiently; and overall machine balance that means smooth operating control. Illustrated here are some of the benefits you get; for the *full* story see your nearest Bucyrus-Erie distributor.

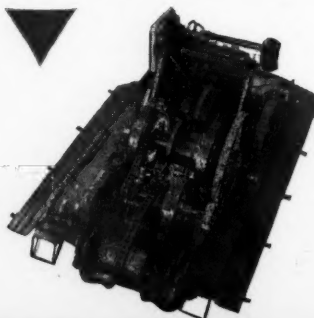
MORE DIGGING POWER

New 88-B positive twin rope balanced crowd system automatically helps operator to proportion speeds and forces properly between hoist and crowd . . . provides greater digging force. Powerful diesel engine is equipped with torque converter drive.



LONGER DIGGING LIFE

Neat, compactly arranged deck machinery is real evidence of outstanding engineering. Parts are simple yet strongly built, and are easy to get at for routine maintenance. Power is smoothly, quietly transmitted by the most direct route through anti-friction bearings.



FASTER DIGGING SPEED

Dig, swing, and dump motions are superbly balanced by Bucyrus-Erie Individual Design. There is no overdigging, underpowering, or excess weight to prevent the operator from getting the exact responses he wants. Clutches are engaged and brakes set by full air control, not just air assist.

To meet *your* job conditions, you can take your choice of three crawler mountings — standard with flat ends, long with tapered ends, or long with flat ends. Four A-frames are offered: standard high and low frames, and power-controlled high and low frames. Front-end equipment for crane, clamshell, dragline and stripping shovel operations is available. Power boom hoist is standard equipment; an independent friction-type boom hoist is also available at extra cost.

138850

**BUCYRUS
ERIE**

South Milwaukee
Wisconsin

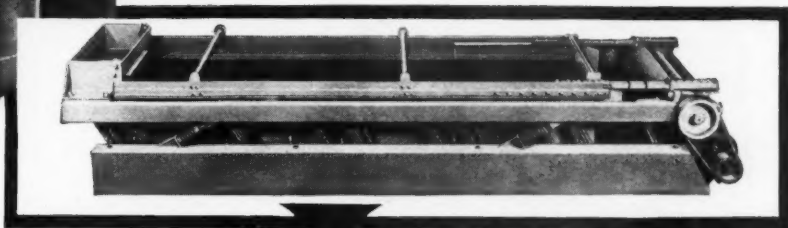
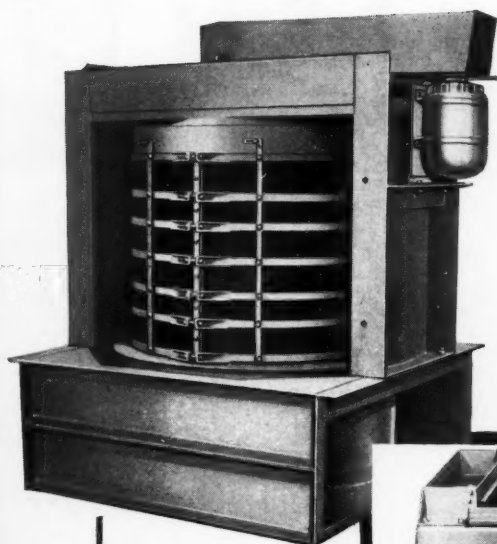
1880 **75** 1955
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to Men Who
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*for Better
Coal Preparation*

... SPECIFY

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... in sizes and types for every coal preparation problem ... wet or dry screening — sizing — rescreening — dewatering or dedusting.



● **SYMONS "V" SCREENS** ... effectively combine centrifugal and gravitational forces. Important advantages include: **HIGH CAPACITY—EXTREMELY ACCURATE SIZING, EVEN IN THE FINER MESHES—HIGHLY EFFICIENT DEWATERING—FULLY ENCLOSED—DUSTLESS OPERATION—FULLY ACCESSIBLE—MINIMUM FLOOR SPACE REQUIRED—ECONOMICAL OPERATION.**

● **SYMONS HORIZONTAL VIBRATING SCREENS** ... in a wide range of sizes and types, all featuring: **LESS BREAKAGE AND DEGRADATION OF EVEN THE MORE FRIABLE COALS—GREATER UNIFORMITY IN GRADED SIZES—WIDE RANGE OF SEPARATIONS—SIMPLE, LOW COST INSTALLATION—LOW MAINTENANCE COST—EASILY ENCLOSED, WITH ENTIRE DRIVE MECHANISM OUTSIDE DUST AREA.**

SYMONS SCREENS have been serving the coal industry for almost twenty years, in many hundreds of screening applications throughout the world. These quality screens have gained an enviable reputation for dependability, efficiency and economy ... backed by the same high standards of accuracy, design and workmanship, and the same advanced engineering that is used in the manufacture of *all* Nordberg Machinery.

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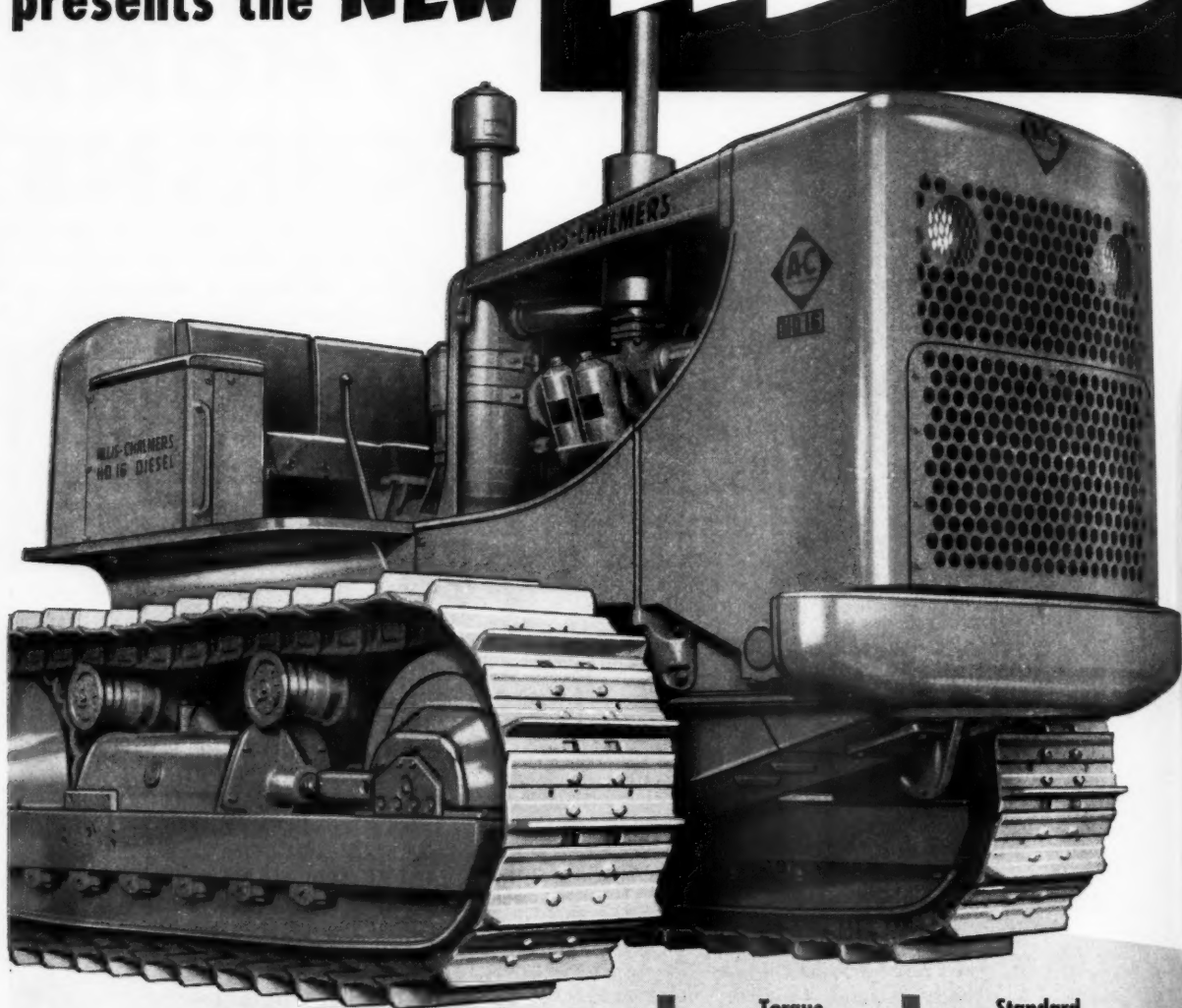
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S454-R

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HD-16



***Your choice of two
outstanding drives***

	Torque Converter Drive	Standard Transmission Drive
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Weight	31,600 lb	31,500 lb
Drawbar pull	up to 60,000 lb*	up to 35,945 lb*

*Limited, under normal tractive conditions, to 90 percent of total weight of tractor and mounted equipment.

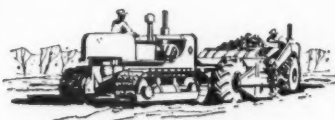
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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

NEW STANDARDS OF PERFORMANCE

for a wide range of heavy-duty work

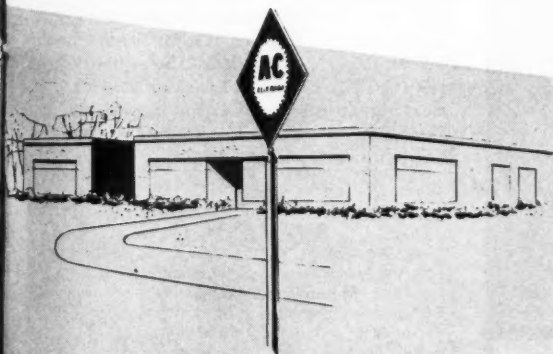
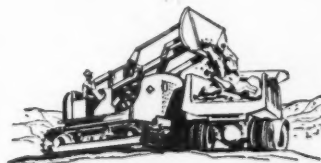
Set your sights on an HD-16! This big new tractor not only brings you *more* power for bigger jobs . . . it makes more effective use of horsepower, with a brand new Allis-Chalmers diesel engine and your choice of two new drives — the job-proved torque converter or the easy-shift standard transmission. Either way, the HD-16 brings you a new high in tractor-operator efficiency . . . a new high in work done under even the toughest conditions.



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under all conditions!

The HD-16 follows the Allis-Chalmers *advanced basic design*, with such important features as its all-steel, Box-A main frame and one-piece steering clutch and final drive case . . . straddle-mounted final-drive gears with tapered roller bearings . . . unit construction . . . simplified lubrication and service designed with *better* maintenance in mind. What's more, it is newly engineered throughout to provide big safety factors in all components . . . plus outstanding new features like the new Allis-Chalmers heavy-duty diesel engine, new "wrap-around" radiator guard, husky new transmissions, new true-dimension track, and many others.



All in all, the new Allis-Chalmers HD-16 brings you an outstanding combination of performance and long life with both mounted and drawn equipment . . . a higher rate of production, more working time, more work done, **LOWERED JOB COSTS**. You **OWE** it to yourself to get all the facts now from your nearby Allis-Chalmers dealer.

We make our own fine alloy steel — and make it nickel-rich — to make TIMKEN® bearings tougher



NICKEL makes steel tougher. So, our steel-making specialists don't skimp on nickel in the fine alloy steel we make for Timken® tapered roller bearings. They use exactly the right amount of nickel to give these bearings the toughness they need to withstand shock and last longer. Exacting quantities of chromium or molybdenum or both guarantee uniform hardness. By using the steel industry's first direct-reading spectrometer, we exercise hairline control of each element at the precise instant of tapping the furnace.

Rolling, annealing, and cooling are done with the same meticulous care. And every race and roller that goes into a Timken bearing is precision case-carburized to give it a hard, wear-resistant surface over a tough, shock-resistant core.

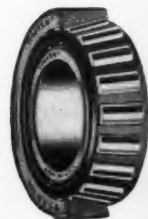
We've been specializing in the production of fine alloy steel for almost forty years. We're the only bearing manufacturer in the country that makes its own steel, because it's the only way we can make sure the quality of our bearing steel is just the way we want it. Steel is the heart of the bearing. That's why we insist on controlling bearing quality *every* step of the way—from melt shop to final bearing inspection. And that's why we don't skimp on the use of nickel.

To be absolutely sure of the highest performance standards in the equipment you build or buy, always specify Timken tapered roller bearings. They are made from seamless tubing or forgings by the most modern processes, under strict control. Only Timken bearings roll so true, have such quality thru-and-thru. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



*This symbol on a product means
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Only **TIMKEN®** bearings roll so true,
have such quality thru-and-thru



JUNE, 1955

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Mining

CONGRESS JOURNAL

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FRONT COVER: Operator's view of the Truax-Traer Wheel Excavator recently put into operation at Firth, Ill.

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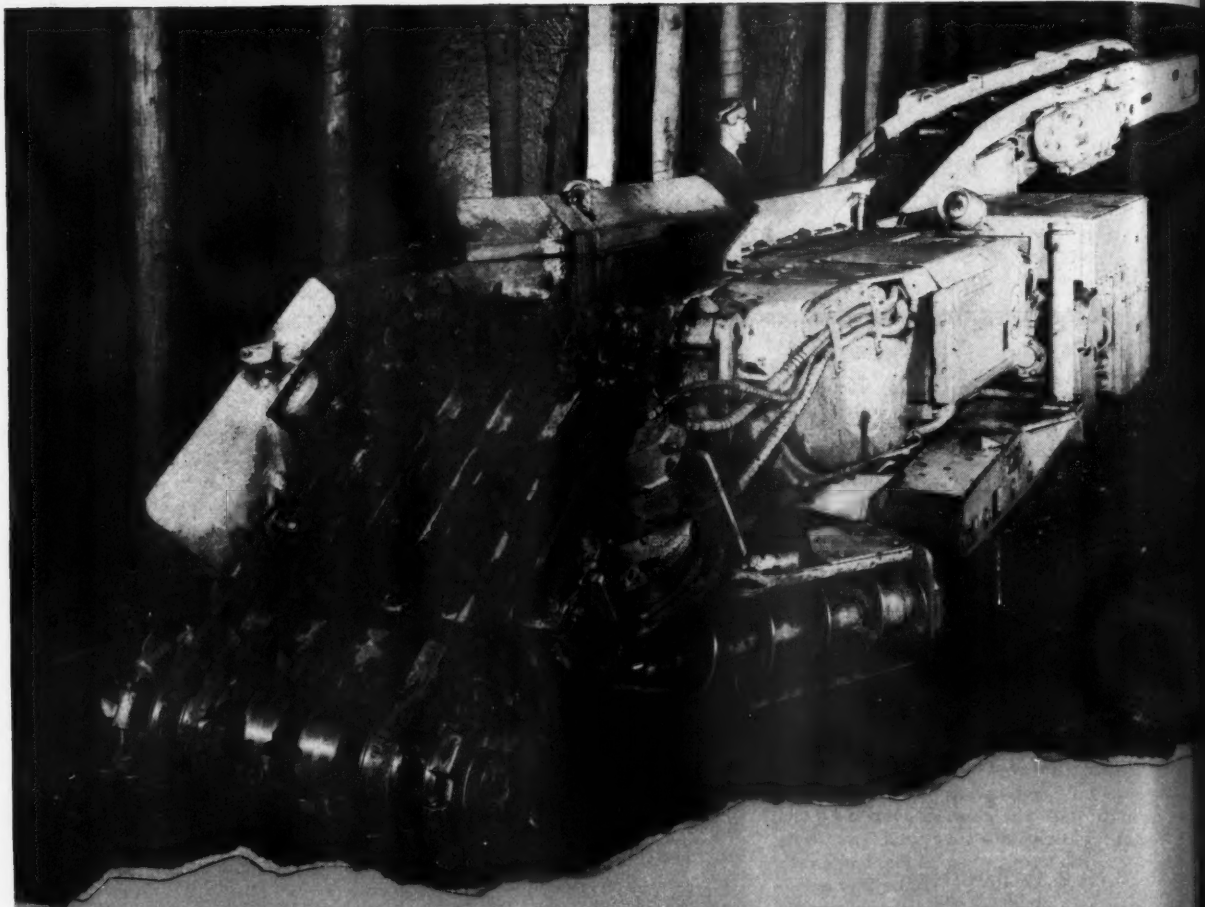
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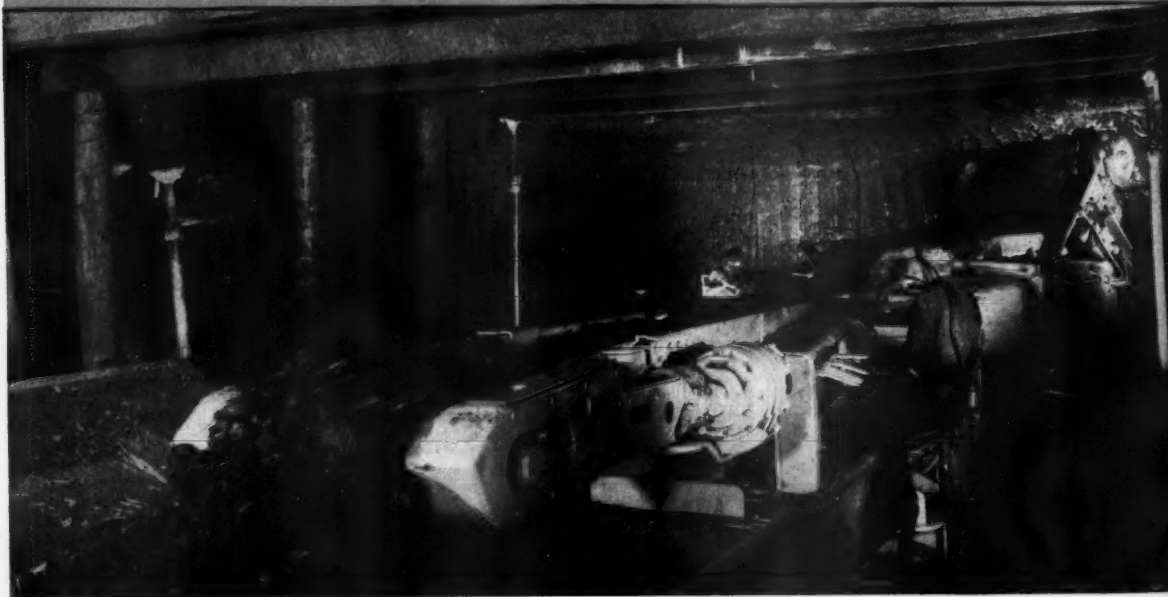
JULIAN D. CONOVER
Exec. Vice-President and Secretary



Member
Audit Bureau of Circulation



This is the JOY 1-CM Continuous Miner



Here's what the 1-CM did during a recent month's run

TOTAL PRODUCTION FOR THE MONTH (RAW COAL).....	17,818 TONS
TOTAL SHIFTS WORKED (TWO ON-ONE OFF).....	39
AVERAGE PRODUCTION PER SHIFT.....	457 TONS
BEST PRODUCTION SHIFT.....	650 TONS
WORKING CREW CHARGED TO THE UNIT.....	8½ MEN PER SHIFT
AVERAGE PRODUCTION PER MAN PER SHIFT.....	53.8 TONS



The results above cover a regular month of operation in a West Virginia mine. The Joy 1-CM unit was teamed with two Joy 10-SC shuttle cars unloading on belt conveyors. The coal is in the Pittsburgh seam and averages about 8 feet in thickness. Mining height is limited to about 7 feet, some head coal being left for roof support, and some bottom coal because of high ash and sulphur content.

DIFFICULT CONDITONS ...

The seam contains numerous clay veins varying from a few inches to 4 feet thick, resulting in both bad top and bottom when encountered. Frequency of these clay veins is indicated by the fact that 76 shuttle car loads of clay vein material were hauled during the period covered by this performance report. The seam also contains some pyrite in the form of lenses and laminations. The top was controlled by wood timbering as the Miner advanced, followed later by roof bolting on the off-shift.

EXCELLENT RESULTS!

You'll note that the Joy 1-CM showed an average production for the month of 457 tons of raw coal per shift, or 53.8 tons per man-shift. That actually represents an increase of about 40% over conventional mining methods. It is also an interesting fact that the size consist varied very little from conventional methods. *Those are results that speak for themselves!*

For heavy-duty operation and high-tonnage production in seams of 52" and higher, the Joy 1-CM-2 model (illustrated at left) will pay you handsome dividends in reduced cost per ton. For lower coal, there's the popular 3-JCM Continuous Miner, only 34" in over-all height. ● Let us help you to protect and increase your profit margin under today's conditions. Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario



Write for Bulletins, or
Consult a Joy Engineer

W&D CLS492

JOY

WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING EQUIPMENT



Now—a roof support that gives instead of collapsing

Here is a truly major development in mine-roof control — a real step upward in safety and downward in maintenance costs. It's the Bethlehem Yieldable Arch, so called because its design permits the arch to yield, rather than bend or buckle, under excessive underground pressures.

The Yieldable Arch is made up of U-shaped segments heavily flanged to resist collapse and torsional stresses. Segments are joined by means of U-bolt clamps, creating friction joints which slide or yield under heavy pressures.

The yielding of the roof support permits the natural relaxation and stabilization of the surrounding strata. At the same time, the increased overlapping of the segments strengthens the arch and adds to safety in the mine.

Individual arches are tied together by horizontal struts which are clamped to the arch with special J-bolts. The struts help the arches to reinforce each other, and transmit

lateral forces from one arch to the other. Bethlehem can also furnish steel lagging with the arches, if desired.

The Yieldable Arch is quick and easy to install, promises a very long life and high recovery value. It should pay for itself in its first year. A Bethlehem engineer is ready to discuss the full story with you. It's worth hearing. Just get in touch with the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM YIELDABLE MINE ARCH



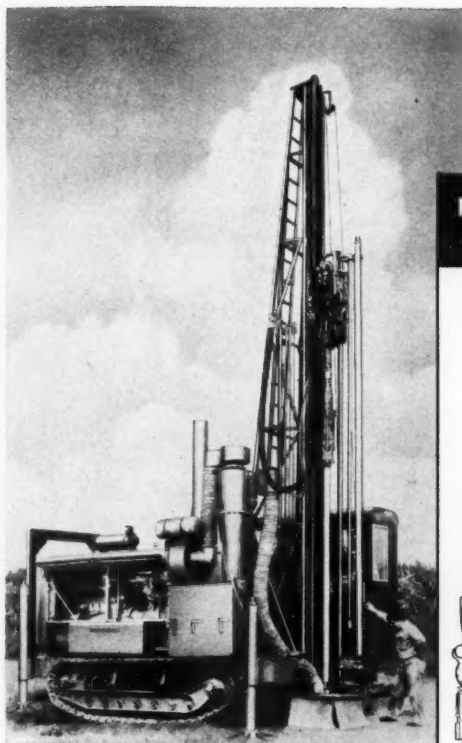
new three-way



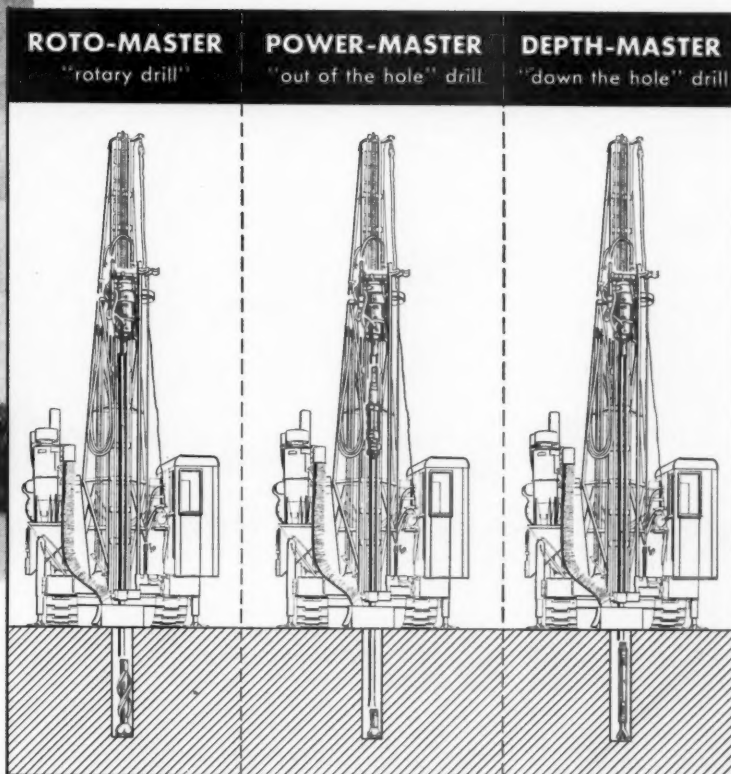
DRILLMASTER

... the only self-contained, self-powered
drilling rig that combines these

3 advanced drilling methods:



Ingersoll-Rand Drillmaster equipped with the Power-Master "out of the hole" drill. Independent rotation is provided by the Roto-Master rotary drill.



Here's a totally new *three-way* rock drilling machine that provides a range of hole sizes and drilling depths heretofore not available.

The ROTO-MASTER rotary drill is ideal for roller cone bit drilling of holes up to 6 1/4" in diam. in relatively soft ground.

The POWER-MASTER combination provides maximum efficiency for hard rock percussion drilling of holes up to 4 1/4" in diam. and up to 60 ft. in depth.

And the DEPTH-MASTER "down the hole" drill provides maximum drilling speed for percussion drilling of 6" diam. holes to any practical depth in quarrying and construction work. This unique drill actually goes down the hole with the bit, eliminating the waste of power normally required to overcome the inertia of long lengths of drill steel.

For the complete story on this revolutionary new three-way Drillmaster, send today for your copy of Bulletin No. 4164.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.



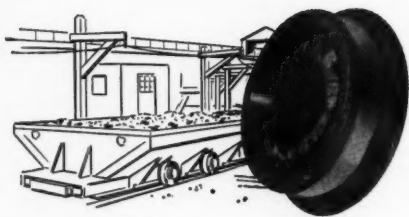
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ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • PUMPS • OIL & GAS ENGINES

[Page 9]



Don't put all your eggs in one basket



Q C f Replacement Parts for Mine Cars!
Give your cars a new lease on life...ask for literature on the new 'Load Support' Mine Car Wheels for longer wear!

Your production is always in jeopardy...when you depend upon a coal handling system that can be shut down by one small repair job.

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Your friendly **Q C f** Representative will gladly show you actual cost and production records...supplied by mine operators...which clearly prove our point.

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San Francisco—Berwick, Pa.—Huntington, W. Va.

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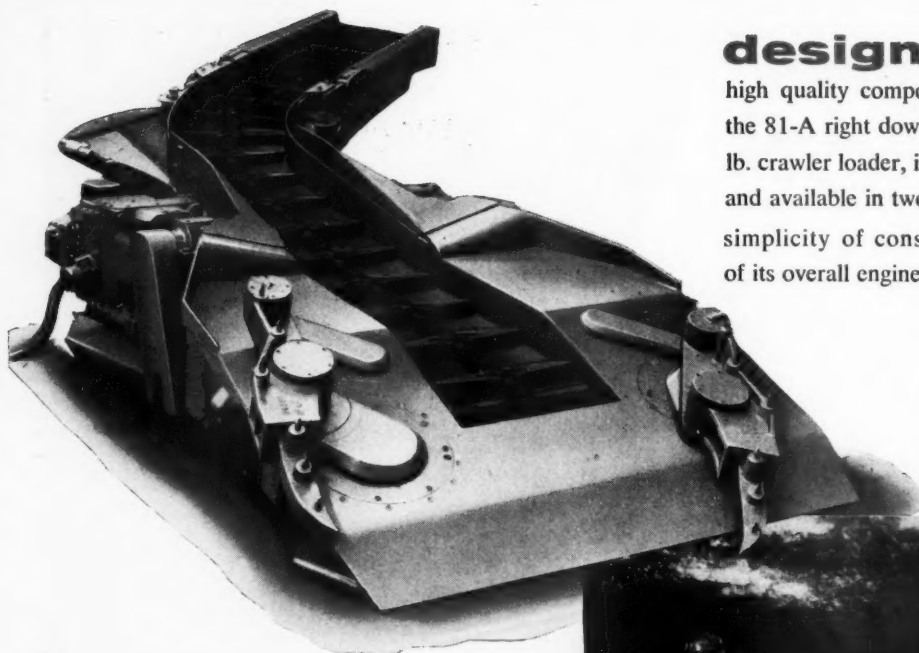


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TRUCK CRANES • MOBILCRANES • LOG LOADERS

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design Good balance, strength, high quality components—all are built into the 81-A right down to the cleats. A 19,500 lb. crawler loader, it is 6'2" wide, 23'8" long and available in two heights. Clean lines and simplicity of construction are keynotes of its overall engineering.

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Big power for the toughest loading jobs—that's because 64 Horsepower is at your command. Rated capacity is 8 TPM; maximum capacity is 10 TPM. Trams at 137 FPM. The 81-A moves fast from place to place, hits its loading stride quickly and stays on the job till the work is done.



flexibility Conveyor swings 45° either side of center and elevates to properly load shuttle cars on the straight or in break-throughs. Loader can be turned in its own length. Easy maneuverability fits the 81-A right in with your other face equipment and mining cycle.

JEFFREY 81-A... no other loader gives you as much !

maintenance Features like these make the 81-A Loader a real bonus buy on upkeep:

1. Gathering head is fully gear driven . . . no chain drives between head motors and gathering arms.
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4. Jeffrey's own high-quality chain is used on traction drive and conveyor discharge.
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PATTIN'S *new* "D-2"

a lower-cost Expansion Shell—
fool-proof and trouble-free...

The "D-2" is a modified improved version of the outstanding style "D" shell, as it features a new bail and a stop-means which makes it very effective in exceptionally soft roof.—The disc type bail covers the threaded hole in the wedge nut and keeps bore hole cuttings from falling in the nut and fouling-up the threads during insertion of the bolt in the bore hole.

The recesses in the wedging surfaces of the shell and wedge nut provide a stop which eliminates the possibility of the wedge nut being pulled through the shell in any roof—regardless of how soft it may be. These features plus the other well-known advantages of the PATTIN shell make it the easiest to install and gives the strongest and safest possible anchorage. Available for $\frac{5}{8}$ and $\frac{3}{4}$ inch bolts. Our roof bolt experts are available for demonstrations of the new shell—write us today.



SHIPPING TUBE

When PATTIN bolts and shells are shipped assembled—a protective tube is placed over the shell to protect the bolt threads and the shell while in transit and being handled. This reduces damage and loss of parts and aids in quicker handling and installation.

PATTIN

MFG. COMPANY
"The Pioneer in Roof Bolting" Marietta, Ohio

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NEW
PRINCIPLE
FOR
VIBRATING
SCREENS**

hi-G

Here, at last, is the answer to the demand for larger vibrating screens with lower power and space requirements . . . it's the revolutionary new Hewitt-Robins hi-G Screen.

Utilizing the principle of "modified resonance", the new Hewitt-Robins hi-G Screen develops a controlled, extremely sharp vibrating action. As a consequence, the hi-G Screen requires only small, easily accessible exciters, or vibrating units, and demands only one-quarter to one-half as much power as normally needed for comparable screens.

Standard hi-G Screens are now available in sizes up to 6' wide by 28' long and require no more than a 15 HP drive.

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HEWITT-ROBINS INCORPORATED
Stamford, Connecticut

Gentlemen: Please send me complete descriptive literature on the new hi-G Vibrating Screen.

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You buy right when you buy MACWHYTE wire rope products!

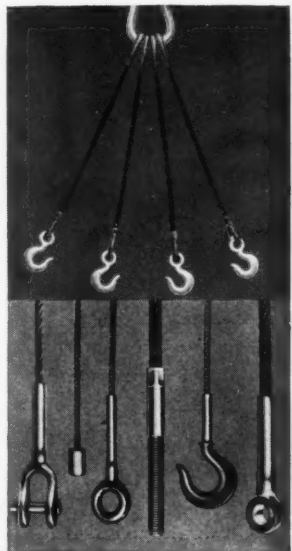


Wire Rope You are assured of getting the *right* rope at Macwhyte no matter what your equipment need . . . no matter how tough the going. There's no guesswork when you buy from a thousand and one types, sizes, and grades of wire rope.

Monarch Whyte Strand wire rope is available PREformed and Internally Lubricated, in Lang Lay, Regular Lay, and with Independent Wire Rope Core or Fiber Core. Ropes are made of Bright Steel, Galvanized Steel, Stainless Steel, and Monel Metal, and are supplied properly lubricated and fabricated to serve well under the severest service conditions. *Catalog G-16 is available.*

Slings Hundreds of sizes and types of Macwhyte wire rope slings are designed with the lightness, flexibility, and handling ease you need for efficient, low cost material handling. Three body styles are made: ATLAS Round-Braided, DREW Flat-Braided, MONARCH Single-Part. *Request Catalog S-8.*

Wire Rope Assemblies Many Safe-Lock wire rope assemblies are made in a wide range of sizes for machine parts, controls, and operating devices. Assemblies provide a unit of wire rope or aircraft control cable with permanently attached fittings made to specified length, size, load capacity. Assemblies are made to both industrial and aircraft standards. *Ask for Catalog 5201.*



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Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables
and Assemblies, Monel Metal, Stainless Steel Wire Rope, and Wire Rope Assemblies.

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Los Angeles 21, 2035 Sacramento



Recommendations on request

10755W

Revolutionary New Stoper for Drilling Roof-Bolt Holes Now Available

Since the very beginning of roof-bolting as applied to coal mines, the Cleveland Rock Drill Division has devoted a great deal of time and effort to provide the miner with a better method of producing roof-bolt holes. We have long realized that the equipment available to the miner, including our own, was not entirely satisfactory. In the past, stopers have been much heavier than necessary, and this excess weight has become a very serious factor, particularly in the lower coal seams. In the past there has been no stoper that would operate satisfactorily and efficiently in coal under about 36".

Wet drilling, as a method of dust suppression, has not been acceptable to the coal miner, and dust collection systems have been both cumbersome and inefficient. Machine maintenance has been high and in some very difficult conditions it has been excessive.

The Cleveland Model S20 Vac-Nu-Matic Stoper has many new features that simplify previous roof-bolt drilling problems

With the foregoing in mind, the Cleveland Rock Drill Division has designed an all new stoper that *eliminates causes for complaint found in other roof-bolting stopers*. The result is the Cleveland Model S20 Vac-Nu-Matic Stoper mounted on the Drift-Nu-Matic Feed, a *new bit* designed particularly for use with our dust collection system, a *new type of drill steel* and an entirely *new dust collection system*. These items are discussed at length in the following paragraphs.



Close-up view of
S20 Vac-Nu-Matic Stoper

The Model S20 Vac-Nu-Matic Stoper, together with the Vac-Nu-Matic Bit, Vac-Nu-Matic Steel, and the Vac-Nu-Matic Dust Box, were designed to be operated as a unit. Substitutions for any one, or all, of these units will result, at the best, in unsatisfactory operation and, what is more probable, no operation at all. In designing these various parts to operate as a unit, we were not activated by a desire to produce a package unit. The simple facts are that all of the units mentioned are interdependent in their operation, and in order to achieve certain definite results, it was necessary to design components that would produce those results.

New design provides for short overall height — operates easily in 26-inch coal

The Model S20 Vac-Nu-Matic Stoper is a standard percussion type drill up to a certain point; beyond that point it was necessary to go into complete new design. The basic problem was to design a machine that would have the shortest possible overall length. In any conventional model of percussion type drill, only two points

present themselves where the machine can be materially shortened. By removing the valve from the inside of the machine and by using an external valving mechanism, we eliminated considerable length.



Novel Sav-A-Change Chuck speeds the roof-bolt drilling operation — reduces number of steel changes

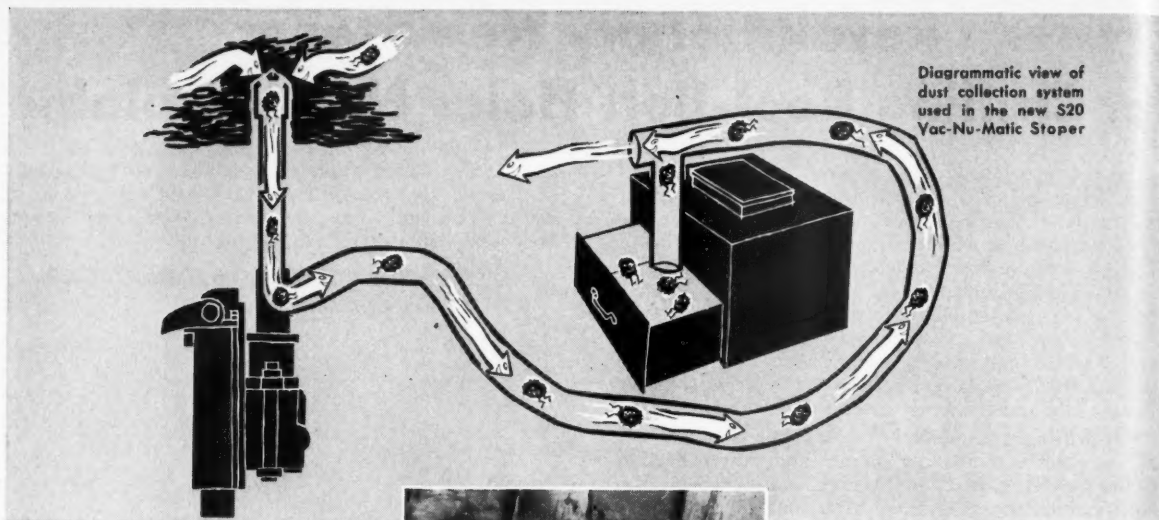
The only other point susceptible to any material shortening is in the design of the chuck. We have designed this machine with two chucks available — the standard socket type and the Sav-A-Change, or peg type of chuck. The Sav-A-Change is a completely new departure in chuck design and enables us, in most cases, to drill a hole four inches deeper than the seam height, without using coupled steel and without drilling an oversized starter hole to enable us to cock the steels that follow. Dust collection through either type of chuck is the same.

No steel is lost in point susceptible to any material shortening is in the design of the chuck. We have designed this machine with two chucks available — the standard socket type and the Sav-A-Change, or peg type of chuck. The Sav-A-Change is a completely new departure in chuck design and enables us, in most cases, to drill a hole four inches deeper than the seam height, without using coupled steel and without drilling an oversized starter hole to enable us to cock the steels that follow. Dust collection through either type of chuck is the same.



Sav-A-Change
Chuck





Diagrammatic view of dust collection system used in the new S20 Vac-Nu-Matic Stoper

Unique Built-in Dust Collection System prevents machine wear — handles wet top

The S20 Vac-Nu-Matic Stoper is the only stoper having a built-in dust collection system that does not remove (or pass) the cuttings through the body of the machine, nor does it use any type of external hood, or dust collection tube. Cuttings are removed through the side of the chuck housing immediately after they leave the drill steel. They are collected from the face through holes in the bit and down through the center of the drill steel.



S20 Solid Stoper Piston

Solid forged parts provide greater strength for longer service life

By eliminating the dust collection through the machine itself, we have been able to seal the machine from external dirt, and since a dust collection tube through the machine is not required, we were able to design solid parts for longer life. The piston is a solid forging and has no holes through the center. The rifle bar is also a solid forging and likewise has no center hole.



Vac-Nu-Matic Dust Box handles wet top easily

Chuck assembly is designed with new principle that permits replacement of chucks underground without dismantling machine

The chuck itself is a solid piece of metal and is not splined to the rotation mechanism as it is in conventional designs. The rotation mechanism consists simply of three slots in

the chuck which match similar slots in the chuck sleeve, and the connection is through three small round pins. The entire chuck assembly is retained in the chuck housing by means of a simple snap ring, and the chuck can be replaced without dismantling the machine. The only tool necessary to replace the chuck is a pair of snap ring pliers. This means that chucks may be replaced underground without the necessity of sending the machine to the machine shop or to the surface.

A unique design has been adopted in controlling the flow of dust and cuttings through the chuck. In this design, wear, attributable to particles of rock impinging on steel surfaces, has been eliminated. The chuck has been so designed that at all points where the directional flow changes a slight build up of dust and cuttings is allowed, thereby allowing the cuttings themselves to protect the steel parts and absorb the wear.



Only snap-ring pliers needed to change S20 chuck

New-type chuck practically free from reciprocating wear

The chuck itself is a floating design. In all present chuck styles the drill rod has a reciprocating action within the chuck. This reciprocating action, combined with the inevitable dirt that finds its way into the chuck, adds up to a wearing or grinding action that, in severe cases, can cause a chuck to become inoperative in a shift, or less. Our new chuck design allows the chuck to float with the steel and eliminates practically all wear due to reciprocation. Inasmuch as the chuck can be sealed off from the rest of the machine, no dirt gets into the body of the machine either from drilling, or from what might normally be carried into the chuck from dirty drill shanks.

S20-Vac-Nu-Matic lightest weight dust-collection type of stoper on the market

The S20 Vac-Nu-Matic Stoper is the lightest dust collection type of stoper on the market. It weighs sixty-nine pounds complete, in the 28" feed size. Other standard feeds available are 46" and 64".

Need for low overall height and long feed led to the development of the Drift-Nu-Matic feed

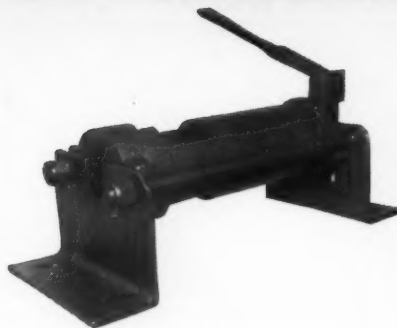
In order to achieve an exceptionally long feed, together with very low height, it was necessary to disregard former feeds and standards of mounting.

With this in mind, the Drift-Nu-Matic Feed was designed. This is an air piston combined with a chain in such a manner that the travel of the machine itself is double the travel of the feed piston. This is the only stoper in which the drill always starts its feed travel at the bottom of the stoper. Regardless of the lengths of feed, the overall starting height of the machine is the same.

In conventional type stopers, whether they are telescopic or otherwise, the starting height of the machine varies according to the length of the feed leg. The overall starting height of the S20 Stoper in all cases is 16½", which means that the length of your starter steel in any case is the difference between 16½" and your seam height, or, in the case of the Sav-A-Change Chuck, the overall height governing the starter steel length is 20½". This means that in practically all cases, at least



Note unusual shape of Vac-Nu-Matic Bit



Cleveland air-operated bit knock-off machine

Unusual Vac-Nu-Matic bit gives key to success of dust collection system and Sav-A-Change Chuck

At the other end of the system we have the Vac-Nu-Matic Bit. This bit is the result of several hundred design experiments and was selected for a number of outstanding qualities. In the first place, it is an exceptionally fast cutting bit. It has adequate pick-up area to insure that all dust and cuttings are collected through the bit itself.

It is designed with an offset shoulder. This feature makes the bit entirely free cutting which, in turn, means that drill steel will always

drop out of the hole freely. There are no stuck steels using the Vac-Nu-Matic Bit.

This bit is the key not only to the dust collection system but to the stoper itself, as it would be impossible to use a Sav-A-Change chuck with other types of bits. With the Sav-A-Change type of chuck the steel must drop out of the hole freely. The connection between the Vac-Nu-Matic Bit and the drill steel is the standard CRD taper connection.

one steel change is eliminated as opposed to conventional type stopers. In some cases, two steel changes are eliminated.

New type steel also aids in positive dust collection

The Vac-Nu-Matic Steel is standard in its external appearance and has a standard CRD taper connection on the end. It has, however, been rolled with a large hole in the center to insure complete dust collection. The large hole is necessary for satisfactory operation. The large hole does not weaken the steel beyond acceptable limits. Field testing of this type of drill rod over a period of several months has revealed no steel breakage whatsoever.

Vac-Nu-Matic Dust Box pulls high vacuum — uses little air

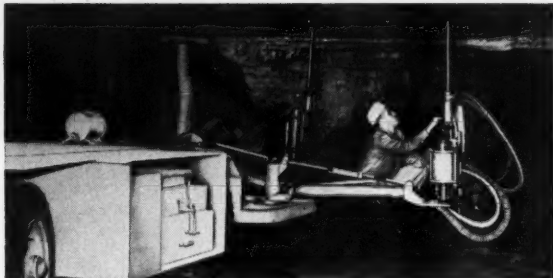
The Vac-Nu-Matic Dust Box is of our standard design with the exception of the venturi. A completely new venturi has been designed that operates on 18 cubic feet of air per minute.

Eighteen cubic feet of air per minute at eighty (80) pounds pressure will produce a static vacuum of 16½" of mercury; fluid vacuum, while the

machine is operating, is 13" of mercury. These figures compare to ten to twelve inches static and as low as ½" fluid in competitive dust collection systems. Cuttings pass into the collection box through a series of baffles which insure that the dust pan fills evenly. Filter bags separate the dust collection chamber from the vacuum chamber.

The box has a capacity of 1¼ cubic feet which is the approximate equivalent of ten 1⅜" diameter holes of average depth. One of the serious problems in dust collection boxes has been the very considerable wear factor due to impingement of dust particles on the metal surfaces inside the box. Here again we have designed to the end that dust is allowed to accumulate at wear points to the extent that it covers and cushions these points and absorbs the wear. There is very little wear in any part of the Vac-Nu-Matic Dust Box and no dust or cuttings passes through the venturi, thus eliminating wear at that point.





S20 is also designed for use with jumbos

Brief summary high-spots the advantages of new S20 Vac-Nu-Matic Stoper design

The Model S20 Vac-Nu-Matic Stoper and dust collection system was especially designed for roof-bolting. It is suitable for any seam height and is the only practical stoper in seams from 36" down to 26". The stoper, dust collection system, steel, and bits are designed as a unit and are interdependent, to produce an exceptionally fast drilling machine with superior free cutting and dust collection qualities. The design of the bit promotes fast cutting action, together with perfect dust collection, and the drill rods will always drop free out of the hole. There is less rotational drag on the machine and no stuck steels even in soft ground.

The drill steel has an oversized opening that passes all cuttings freely. The dust collection system operates with very low air consumption and an exceptionally high vacuum to insure complete collection. Cuttings are removed from the drill at the chuck housing and do not pass through the drill. Because of the large openings and the high vacuum, wet top presents no problem in

dust collection. Our tests indicate that we can collect dust that, when taken from the collection box, will adhere together, and may be balled like a snowball. The design of the Vac-Nu-Matic Stoper is such that it is suitable for use either as a hand-held machine or for jumbo mounting.

First basic change in stoper design since the advent of the self-rotator

The Model S20 Vac-Nu-Matic Stoper, together with its Drift-Nu-Matic Feed, represents the first basic change and improvement in stoper design since the self-rotator.

It is the only stoper that will drill in a hole deeper than the height of the coal seam, without coupled steels.

It is the only stoper that will drill a deeper hole with one steel change than any standard stoper will with two changes.

It is the only stoper that allows chuck replacement without dismantling the machine.

It is the lightest dust-collecting type of stoper available.

It is the only stoper that always starts its feed travel at the bottom of the feed cylinder and continues its feed past the top of the feed cylinder.

It is the only dust-collecting type of stoper that does not remove dust through the body of the machine nor does it use any type of external hood or dust collection tube.

It is the only stoper that is practical in seams down to 26".

From this time on, we feel that the Cleveland Model S20 Vac-Nu-Matic Stoper with its many advantages, will become the *standard of the industry*.

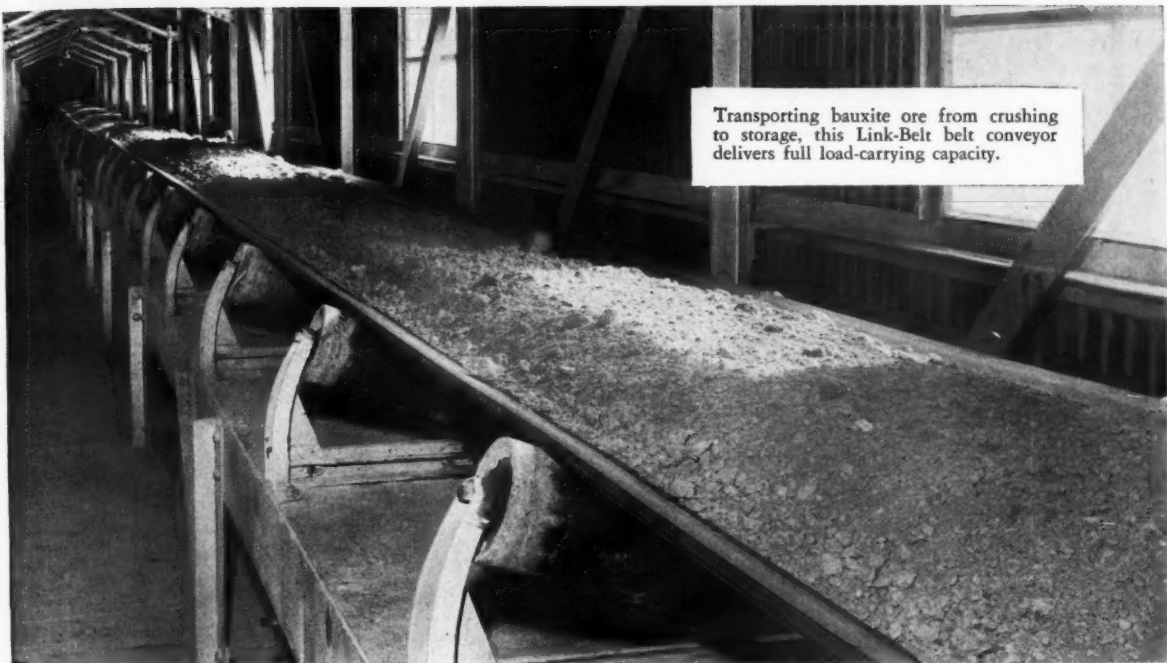


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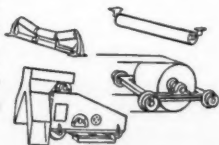
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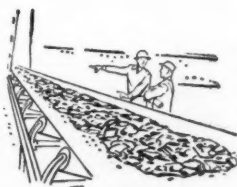


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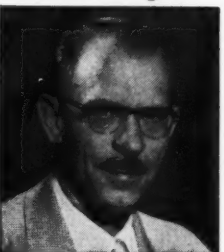
Clarence Thom



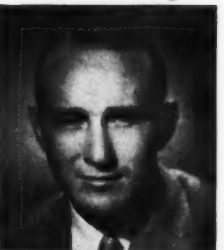
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Leland Logue



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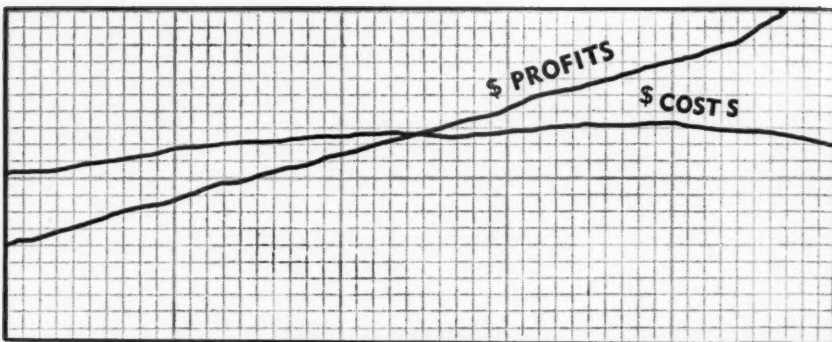


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Pace-Setting HD-5G Tractor Shovel

NOW BETTER 3 WAYS



From the time of its introduction seven years ago, the Allis-Chalmers HD-5G Tractor Shovel has been tops in popularity. Many thousands are daily proving their ability and versatility on all kinds of material handling and excavating jobs.

Now, design refinements make the HD-5G a three-way better value than ever before:

1. Has Bigger Rated Capacity

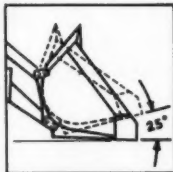
New bucket handles a big 1 1/4-yd load — streamlined design now helps roll in large loads with less tractor effort. The back of the bucket has been brought forward and the sides extended to cut spillage, put more payload where it's wanted.

2. Helps the Operator Do More

Cleaner dumping with the new bucket saves the operator time and effort shaking out loads.

For added versatility, there is a two-position bucket available with both standard automatic return to digging position and operator-controlled tip-back. If the operator chooses to use the controlled tip-back, he can load the bucket, then tip it back approximately 25° before raising, assuring maximum output under special conditions such as downhill loading or loading loose materials.

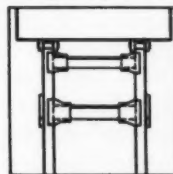
The HD-5G helps the operator do more in other ways, too — giving him full vision, fast and easy control, cleaner platform and more comfortable seat from



which to work, and more working time with truck wheels, support rollers and idlers that need greasing only once every 1,000 hours.

3. Works at Lower Cost

The HD-5G now works at even lower cost than ever before — not just because it *does more*, but because it has features that mean *less maintenance, longer life*. For instance, new type tubular bracing on the bucket booms provides added strength and support, keeps the bucket in line. The floor at the rear of the new bucket has been raised seven degrees to reduce wear on the bottom sheet. Heavy-duty truck wheels and idlers are available for particularly tough working conditions. One-piece, full-length main frame permits unit construction so that major assemblies can be removed without disturbing adjacent units, putting tractor back on the job in hours rather than days.



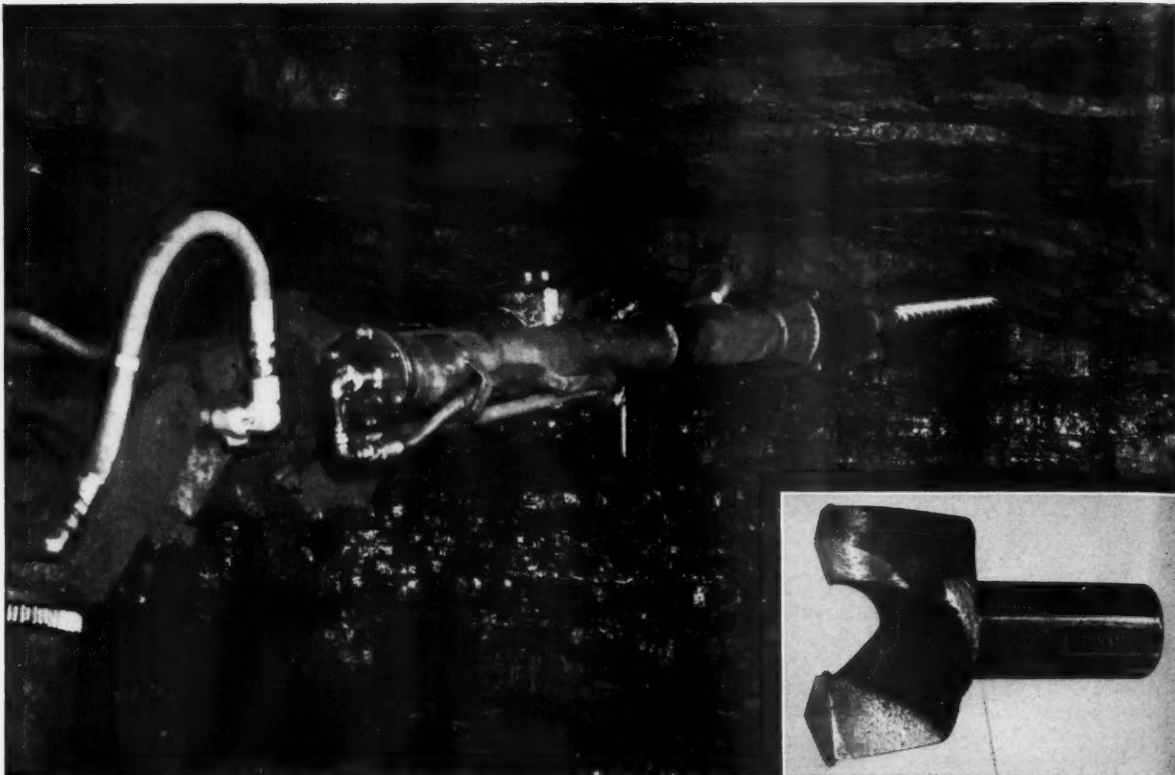
Ten Quick-Change Attachments Add to HD-5G Versatility

Bulldozer	Crane Hook	Tine Fork
Angledozer	Light Material Bucket	Rock Fork
Narrow Bucket	Trench Hoe	— also rear-
Rock Bucket	Lift Fork	mounted Ripper

See your Allis-Chalmers dealer for more about these and other production-boosting features of the popular HD-5G Tractor Shovel.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



This is the Kennametal DB-3 bit used at Gem Coal Company, which gave over 10,000 feet of drilling at a bit cost of 1.2 mills, using a variable speed, variable thrust Jeffrey 56-FHR single arm, rubber-mounted drill.

1706 six-foot holes drilled with a Kennametal* DB-3-Inch Bit

"One third longer service with Kennametal drill bits than any other carbide bit that has been used" . . . reports Herman Jauchius, Superintendent of Mine 255, Gem Coal Company, Nelsonville, Ohio.

As a typical example performance in this mine, a Kennametal DB-3 bit completed 1706 six-foot holes or more than 10,000 feet of drilling in Hocking Seam No. 6 with 28 regrinds. Drilling speed per six-foot hole, using a Jeffrey 56-FHR drill, averaged 20 seconds.

Approximately 190 places, 26 by 6 feet, are drilled per bit life, on an average, with production about 7100 tons of coal per bit. In terms of bit cost per ton, the Kennametal DB-3 bit cost \$.0012 or 1.2 mills per ton of coal produced.

This is one example of why Kennametal bits are used so extensively. Try them in your operation and cut bit costs per ton of coal. Your Kennametal representative will help you put the right tool on the job. Call him today, or write to KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Registered Trademark



Mr. Jauchius and face boss Fuller examine Kennametal drill bit, which has given long service and low bit cost per ton.



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Speed reducer at Fairview Collieries Corp. uses STANOIL Industrial Oil— operates 5 years with no mechanical maintenance



Bert Richardson (left), Preparation Plant Superintendent, and Fred A. Barnes, Standard Oil lubrication specialist inspect Jones speed reducer at Fairview Collieries. Fred Barnes' customers have found that he is a good man to call in on lubrication matters. Fred has had 18 years' experience providing lubrication technical service to Standard Oil customers. He's a graduate of James Millikin University and of the Standard Oil Engineering School.

**STANDARD
OIL COMPANY**
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Management of Fairview Collieries Corp., Danville, Illinois, had had experience with STANOIL Industrial Oil. So when it came to selecting an oil for a speed reducer in the preparation plant, the choice was easy—STANOIL.

The speed reducer is connected to a belt conveyor that moves nearly 10 tons of coal per minute. A shut down of the speed reducer means the conveyor belt stops and the whole plant shuts down. Obviously this is no place for oil failure. Obviously, too, it is the place for STANOIL Industrial Oil.

STANOIL in the speed reducer is changed approximately every twelve months. After five years' continuous operation, the speed reducer is in excellent condition. Herringbone gears and other parts show no evidence of wear. No maintenance work has been necessary. No shutdown has occurred due to lubrication failure.

Ask your Standard Oil lubrication specialist about STANOIL Industrial Oil. In the Midwest, call your nearby Standard Oil office. Or contact Standard Oil Company, 910 So. Michigan Ave., Chicago 80, Ill.

Quick facts about STANOIL Industrial Oil

- 1 Stability.** STANOIL's antioxidant gives oil resistance to chemical change, minimizes deposits.
- 2 Rust Prevention.** Inhibitor in STANOIL "plates out" on metal surfaces prevents corrosion.
- 3 Cold Starts.** STANOIL has low pour point. Flows freely from cold start. No need for costly warm ups.
- 4 Resists Effects of Temperature Change.** STANOIL has high viscosity index, is resistant to change in both high and low temperature service.
- 5 Excellent Demulsibility.** STANOIL is refined to eliminate emulsion problems, contains additive to minimize foaming.



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CHECK RESULTS: Examine each shot for both breakage and displacement. Note methods used, existing conditions, and the amount of secondary shooting required. Surveying results with your ATLAS Representative can uncover ways to effect money-saving improvements. ATLAS Technical Service can help solve your blasting problems... give you better results, better profits.



ORDER WISELY: Advance order your millisecond delays so that periods needed are always on hand. Stock a magazine for your particular needs with the aid of your ATLAS Representative. He'll help you select the right explosives and the Rockmaster blasting patterns best suited to each job. Continuous production and good breakage lower costs, boost profits.

BETTER BLASTING can cut costs and increase production per man hour substantially. A few cost-cutting ideas are shown here. Your ATLAS Representative knows many more, and can recommend those that specifically apply to your particular job. Check your present blasting methods with him. His suggestions may improve your profits considerably. And be sure to get "Better Blasting"—Atlas' periodical bulletin of latest methods and equipment. Put your name on our mailing list today.



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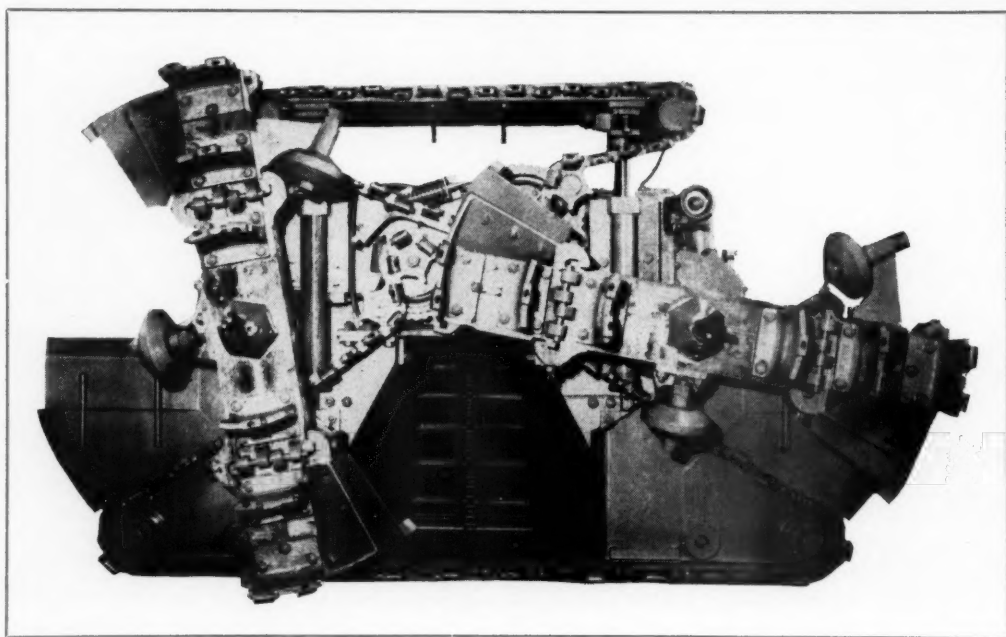
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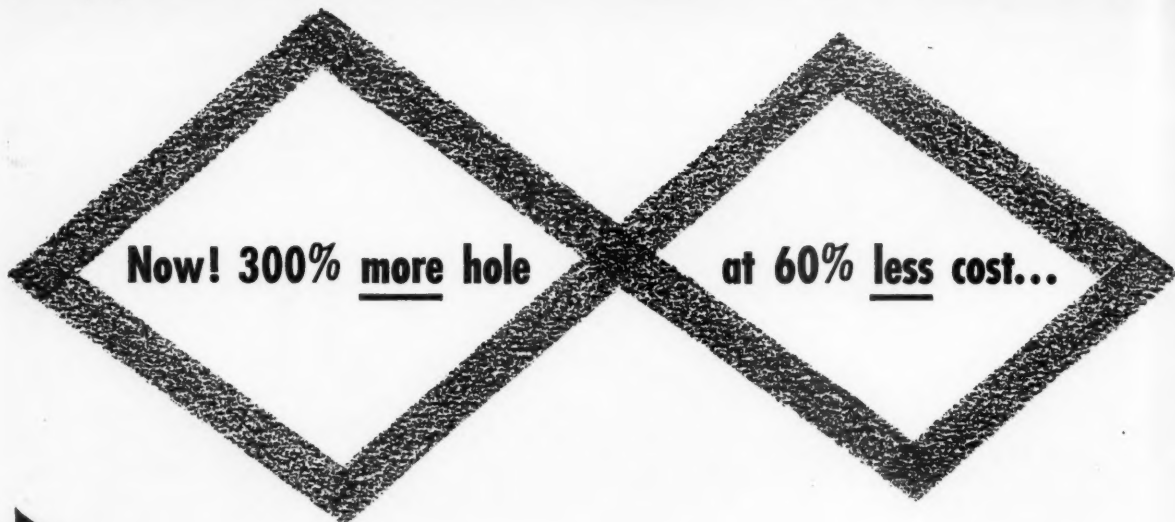
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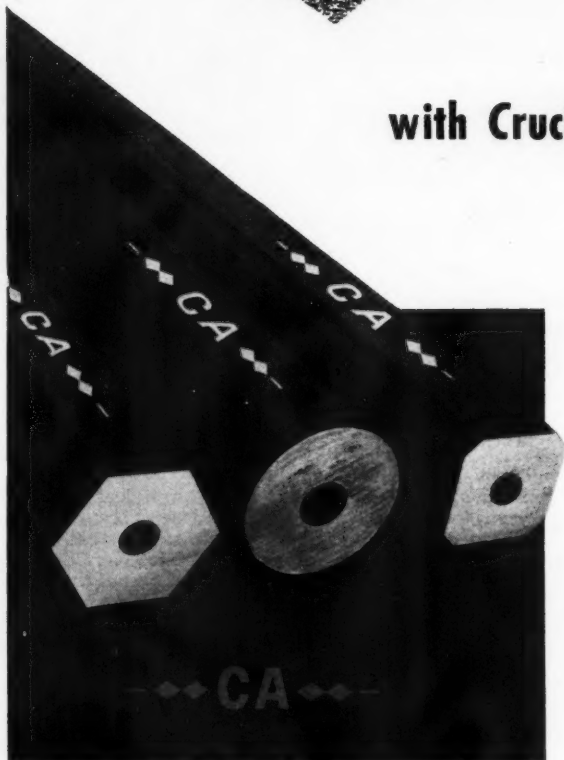
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alloy hollow drill rods



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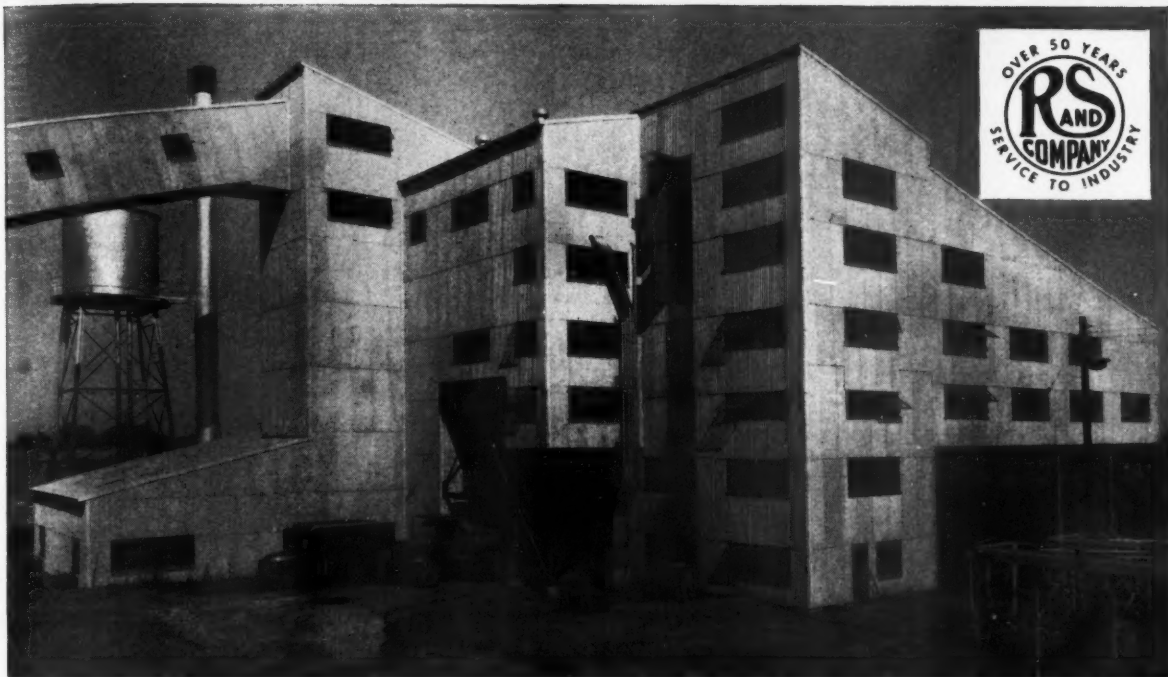
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✠ Editorials ✠

JOHN C. FOX, *Editor*

JUNE, 1955

We're Listening

THE House Interior Committee, and an important segment of the mining industry is awaiting a report from the Department of the Interior, before further action is taken on H. R. 6373. This bill was introduced by Rep. Engle of California and is intended, as interim legislation, to continue the Domestic Purchase Programs for strategic minerals, while the Office of Minerals Mobilization conducts a study to determine and recommend a mobilization base and legislative program for each of these minerals. H. R. 6373 would not extend the time limit for the Domestic Purchase Programs—June 30, 1958—but it would increase present goals.

Mines producing asbestos, beryl, columbium-tantalum, manganese, mica and tungsten are necessary to the defense of the nation. It was to stimulate exploration, development and mining of these ores here at home that the Domestic Purchase Programs were set up. Now that we have a tidy little industry going; now that we are no longer completely dependent on foreign sources of supply, are we going to withdraw all support and let this vital segment of the mining industry fall back into limbo?

An Expression of Faith

IN a special section of this issue (pp 57 to 65) will be found a full report on the American Mining Congress' 1955 Coal Convention and Exposition held in Cleveland, Ohio, May 16-19.

It would be repetitious here to recount who said what at the convention. It is entirely in order, however, to point out again that the large and enthusiastic attendance was convincing evidence of the coal industry's optimism regarding its future.

Manufacturers and suppliers, more than 200 of them, also proved their faith in coal's future—immediate as well as distant—by the impressive array of mining and preparation machinery and supplies they put on display. Some of these mechanical marvels

made their initial bows to the industry at the 1955 Coal Show.

Impressive and interesting as the Exposition was, every one of the operating sessions was well attended. Coal mining men from all parts of the country and from 12 foreign countries came to learn "how the other fellow does it." By providing the forum and encouraging this exchange of information, the American Mining Congress has helped spark the advance of mechanization and modernization in all branches of mining. As long as mining men can swap ideas freely in the meeting rooms, and see at first hand the latest developments in equipment and supplies on display in the exhibition halls, every Mining Congress Coal Show will be bigger and better than the last, and a progressive coal mining industry will continue to supply the basic fuel needs of America's productive machine. The 1955 Coal Show will go down in history as an expression of confidence and faith in one of America's basic industries.

Gross Exaggeration

A RAILROAD bell mounted on a stone pedestal was recently installed in the lobby of the Interstate Commerce Commission building in Washington, D. C. Presented by the St. Louis-San Francisco Railway Co., the stone pedestal bears the inscription "To commemorate the passing of steam locomotives from America's transportation scenes."

The lobby of the I. C. C. building is a fitting place for a monument to the Iron Horse. The steam locomotive has helped in the development and growth of these United States as much, if not more, than any other single agency. But . . . it is still very active in railroad circles and this is hardly the time for an epitaph. There are, according to reliable authorities, more than 6,500 steam locomotives in operation right now. This makes the inscription on the stone pedestal rather out of place. If steam locomotives could talk they might paraphrase Mark Twain's comment under similar circumstances and say "Ladies and Gentlemen, the commemoration of our passing is greatly exaggerated."



Repair shops are located underground in mined-out area

Trackless Mining in British Columbia

Mining Costs Reduced 26.5 Percent Since Introduction of Diesel Equipment Underground

By G. A. GORDON

General Manager
Canadian Exploration, Ltd.

PLACER Development, Ltd. includes in its family the wholly-owned subsidiary, Canadian Exploration, Ltd. Producing properties of Canadian Exploration are located 125 miles north of Spokane and 10 miles north of the U. S.-Canadian boundary, near Salmo in the Nelson Mining Division of South Eastern British Columbia.

Several papers have been presented to the Canadian Institute of Mining and Metallurgy. The "History of the Properties" by J. D. Little and the "Geology of the Orebodies" both lead-zinc and tungsten by C. W. Ball, Q. G. Whishaw and F. H. Mylrea were published in the *C.I.M.M. Bulletin* of August 1953.

In addition, a paper on the "Underground Ore Crusher and Conveyor System" by A. D. McCutcheon, C. M.

McGowan and G. H. Walkey and a paper on "Lead-Zinc Mining Methods" by Little and Walkey were published in the *C.I.M.M. Bulletin* in September 1954.

History of Mining Methods

History of the lead-zinc operations dates back to 1908. Mining methods have passed through several phases and were strongly influenced by three factors—the attitude of the ore, the characteristics of the wall rock, and the price of metals.

In the first phase from 1908 to 1926, the mine was operated as a small lead mine. Lead ore was mined from narrow bands in the northwest portion of the property. The mining method was open stoping to chutes.

In the second phase, 1926 to 1949, development work consisted of stripping, short adits and of chief significance a property wide, geological map was made of all outcrops by Harold Lakes, the grand old man of Canadian exploration.

Diamond drilling at the south end of the property in 1947 and 1948, under the direction of Harold Lakes, blocked out 60,000 tons of good grade lead-zinc ore.

In 1949, this ore was mined as an open pit. After the ore was drilled by pluggers and blasted, it was slushed to a loading chute and loaded into trucks for transportation to the mill. In this year two adits were driven North from the south end and exploratory diamond drilling from surface indicated the larger ore picture and launched a third phase. From 1949 to 1952 stoping consisted of slusher panels, 40 to 50 ft wide and about 150 ft long. Broken ore was slushed down hill to draw points. Electric locomotives, operating on 18-in. gauge track, loaded two-ton cars from chutes for removal from the mine.

Ore Picture Completed

By that time a more complete picture of the ore was available. The orebodies are of the disseminated replacement type with sphalerite, galena and pyrite replacing a dolomitized basal section of a lower Cambrian limestone. Intense folding of the underlying skarn and argillite result in a very irregular foot wall. Distortion lessens rapidly approaching the hanging wall which reflects the

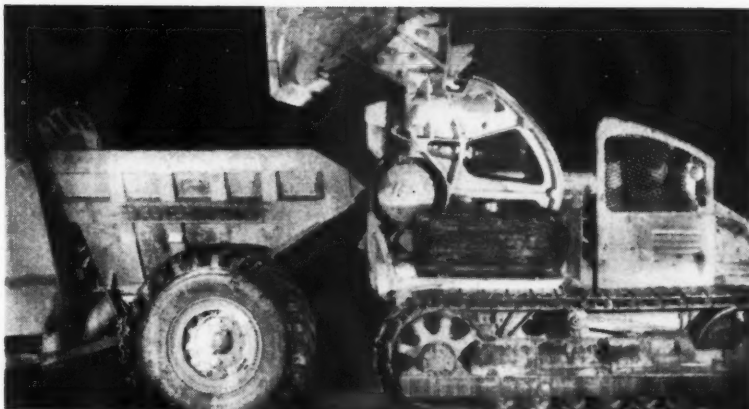
gently dipping overlying limestone. The orebody ranges up to 2000 ft wide (east to west) and about 7000 ft long (north to south). Thickness varies from zero up to 70 ft with an average in the minable portions of 15 ft. The plunge varies from flat to 33° and averages 15° to the south. There are several normal faults dipping northeast which tend to flatten the plunge. The limestone hanging wall is competent and large untimbered openings are possible.

Start Trackless Mining

This information introduced the fourth phase in September 1952, trackless mining was started. A 14 by 14-ft tunnel was driven east and entered the ore at 850 ft from the portal.

The first drilling was done with jack legs, but two crawler mounted drill rigs are now used. These are each equipped with three hydraulic 10-ft drill booms. Each boom has a 13½-ft chain feed on which is mounted a 3½-in leyner drill. This allows a 12-ft hole in one pass. Inch and a quarter, round carbon steel is made up with lugs at the chuck end and is threaded for two-in. Timken four-wing tungsten carbide bits. Two men operate the three drills and average 700 ft per jumbo shift with a maximum of 1200 ft. Tonnage broken per jumbo shift averages 500 tons.

The first loading was by Rogers ramp loaders. These steel ramps support a 50 hp, three-drum electric slusher hoist and slushed up the steel ramp to drop ore into trucks. Maintenance cost on this equipment is low but productivity is also low. In future, it is expected to use them to slush steeply dipping or thin ore where other equipment would require extensive waste removal. Capacity per shift has averaged about 225 tons. In order to open up development head-



Rocker shovel and dump trucks make economical loading—haulage team



Crawler mounted drill rigs each carry three 10-ft drill booms

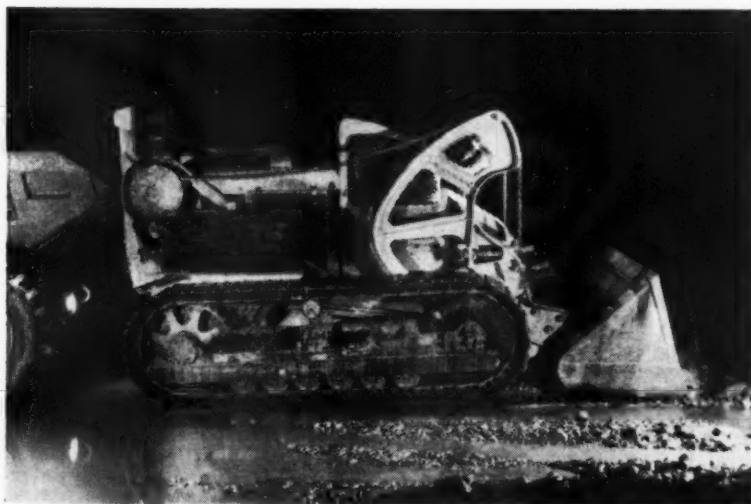
ings in ore, three Eimco 104's were purchased. These overhead loaders have handled over 300,000 tons but have been found a little light and

underpowered for the duties expected of them. Capacity ranges from 300 to 600 tons per shift and including travelling time averages about 350 tons per shift. Costs including depreciation have leveled off at 28 cents per ton. An Eimco 105 has been purchased. For our purposes, the 105 is a very definite improvement on the 104. Capacity per shift is expected to average 650 tons. Costs including depreciation are expected to average between 12 and 15 cents.

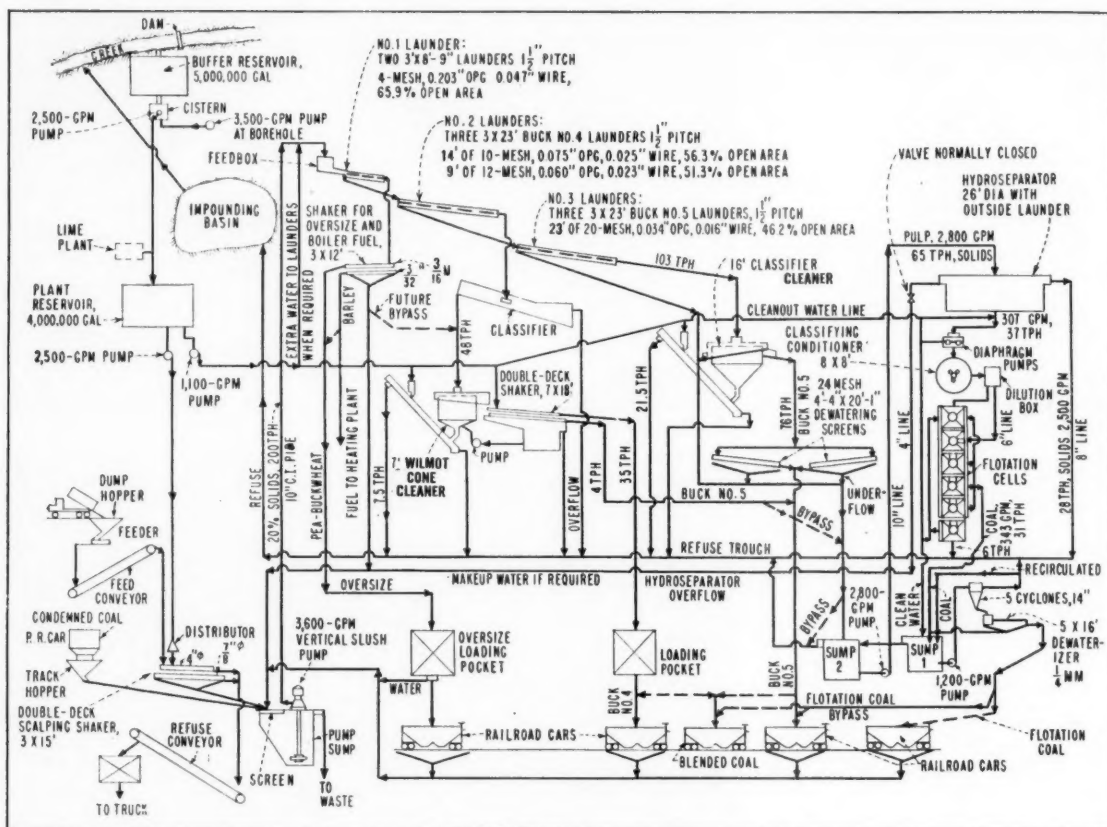
In addition, the company has on rental-purchase, a Thew Lorain scoop shovel with a 1¼-yd scoop type bucket. Use of this equipment is still experimental. About 30 percent of the ore could be handled with this or similar equipment. Costs and productivity appear to be around 15 cents a ton with a shift capacity of about 500 tons.

The first haulage units we tried were conventional hydraulically operated end dump trucks of seven-cu yd capacity. One type of these was powered with the Cummins 4-cycle

(Continued on page 55)



A minimum of 750 cfm of air is required for each diesel horsepower in operation



Flowsheet of No. 5 Highland Plant, Jeddo-Highland Coal Co.

Anthracite Recovery From Silt Deposits

Recover 785 Tons Per Shift of Clean Coal from Former Waste Material

By H. R. MIDDLETON

Sales Manager
Wilmot Engineering Co.

EMPLOYEES at the Highland No. 5 cleaning plant of the Jeddo-Highland Coal Co. are proud of their fine coal preparation facilities. The plant is the newest in the anthracite region of Pennsylvania and is presently producing approximately 120 tph of Nos. 4 and 5 Buckwheat coal.

Because of its geographical location among the mountains of the Middle Eastern Coal Field, the Jeddo-Highland Coal Co., Jeddo, Pa., has always been able to impound the waste matter

from their preparation plants. Suitable land for this purpose, ideally located close to their operations, was available. Over the years, the cleaning plant wastes have thus formed two deposits of silt which will support the operation of the Highland No. 5 plant for at least 10 years at the present rate of production. One of these deposits is within a half mile of the plant and the other somewhat further away. Additional deposits are available in nearby areas.

Size, consist and ash analysis of these two deposits varies considerably. A breakdown on the portions presently being worked is listed in Table I.

The portion of the No. 5 Bank now being processed is particularly good. The average ash of this bank usually runs about 25 percent.

A study of the flowsheet will show the washing circuits. Note that tonnages moving in the various circuits are shown.

The fine coal cleaning units were installed in a portion of an existing plant, the Highland No. 5 Breaker, which had been shut down since shortly after World War II and was maintained as a standby plant. All original equipment was removed, half of the structure razed, and the other half substantially rebuilt to house the new equipment.

Feed and Primary Separation

At the bank raw material is loaded into trucks by power shovels and hauled to the preparation plant where it is dumped into a feed hopper. A 10 by 10-in. grizzly over this hopper removes the large pieces of material that were used to raise the retaining banks as silt was deposited. Feed to the plant is taken from the bottom

of the hopper by a push feeder at the rate of 200 tph to a flight conveyor. This conveyor discharges to a double deck scalping shaker where the plus $\frac{3}{4}$ -in. is removed and conveyed to the refuse bin. The minus $\frac{3}{4}$ -in. material is slushed into a sump tank for pumping to the top of the cleaning plant.

The main feed pump is a 3600-gpm Hazleton Type "VS" slush pump. This pumps 200 tph of feed containing 20 percent solids, through a 10-in. cast iron pipe to the feed box at the head of two primary launder screens. Overflow from these screens is an oversize which is split on a double deck shaker to a pea, buck and rice fraction and a barley fraction. The pea, buck and rice fraction is directed to a loading pocket and transported by railroad to the No. 7 breaker for cleaning. The barley fraction is used for heating purposes, with any surplus being sent to No. 7 breaker with the pea, buck and rice.

Underflow from the primary launder screen flows to three secondary launder screens where the No. 4 buckwheat feed for the seven-ft diam Wilmot cone cleaner is removed. The No. 4 feed is deslimed and dewatered, before cleaning, in a 60-in. by 27-ft, 9-in. triple spiral Wemco Classifier. Underflow from the secondary launder is fed to a final set of launders which overflows No. 5 Buckwheat feed to a 16-ft diam Wilmot Classifier Cleaner. The underflow of these launders is dropped into the feed sump of the flotation circuit along with the underflow from the classifier dewatering screens.

Flotation Circuit

Flotation feed is pumped by an eight-in. 2800 gpm Hazleton Type "CB" volute pump through a 10-in. line to a 26-ft Dorr Hydroseparator, which overflows minus 200-mesh fines to waste. Provision has been made, in case of emergencies, to return some of this overflow to the plant feed sump as make-up water.

Underflow of the hydroseparator (40% solids) is pumped by a Dorrco 8W duplex diaphragm pump to an 8 by 8-ft Denver-Turrall conditioner. The conditioner is equipped with a conical section at the bottom and a baffle plate to provide an effective separation of high ash impurities, and concentrate them at the bottom of the cone. An airlift is employed to remove this high ash material from the system before it can build up to the point of being included in the feed to the cells. The airlift is operated about 20 minutes per hour except when feed is very high in ash or sandy. Then it operates continuously. Air is supplied at a pressure of 10 psi.

The flotation feed overflows from the conditioner through two 6-in. pipes into a dilution box where it is diluted

	Highland No. 2 Bank		Highland No. 5 Bank	
	Wt. %	Ash %	Wt. %	Ash %
+ 3/32-in.	6.28	18.8	2.08	15.7
+ 3/64-in.	17.78	17.6	13.52	8.4
+ 40M	39.10	23.6	46.00	13.3
+ 60M	16.52	24.7	17.44	16.6
+ 80M	5.50	27.4	5.24	23.8
+ 100M	3.68	30.1	3.48	30.9
- 100M	11.14	41.1	12.24	46.4
	100.0	25.0	100.0	18.8

Table I. Screen analysis and ash content of silt being washed by Jeddo-Highland

No. of Shifts	173
Total input	236,906 tons
Total output	130,582 tons
Breakdown of output	
Pea	87 tons
Buck	406 tons
Rice	1,209 tons
Barley	3,950 tons
No. 4	31,636 tons
No. 5	93,294 tons
Total	130,582 tons

Note: During February the Av. ash on No. 4 was 8.8% and on No. 5 was 10.1%.

SCREEN ANALYSIS OF RECOVERED COAL			
No. 4 Coal Sizing		No. 5 Coal Sizing	
+ 3/32"	9.28%	+ 14M	3.22%
+ 3/64"	82.64%	+ 20M	15.89%
- 3/64"	8.08%	+ 40M	50.24%
		+ 60M	18.87%
		+ 80M	5.92%
		+ 100M	2.12%
		- 100M	3.74%

	Feed to Cone Cleaner	Cone Cleaner Product
	Wt. %	Wt. %
+ 3/32"	16.02	9.00
+ 3/64"	62.80	81.04
- 3/64"	21.18	9.96
	100.00	100.00
Total Ash	16.9%	9.2%

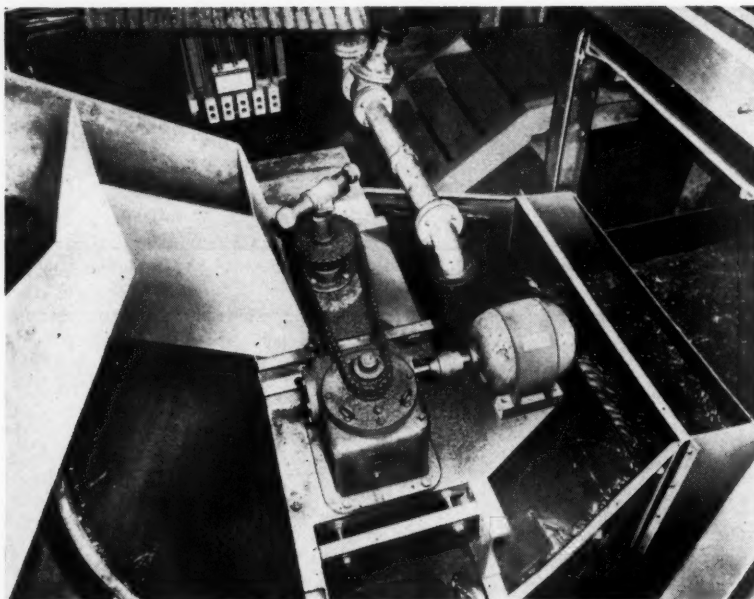
	Classifier Cleaner Feed	Classifier Cleaner Product
	Wt. %	Wt. %
+ 3/64"	17.40	10.32
+ 1/32"	25.64	19.76
+ 35M	40.32	47.08
+ 48M	11.08	15.04
+ 100M	4.20	6.12
- 100M	1.36	0.88
	100.00	100.00
Total Ash	21.7%	10.9%

	Dorr Classifier Overflow		
	Wt. %	Ash. % Dir.	Ash % Cum.
+ 60M	1.20	17.5	
+ 80M	0.90	8.6	13.7
+ 100M	3.00	9.3	11.1
+ 150M	9.10	13.7	12.8
+ 200M	9.00	19.0	15.2
- 200M	76.80	48.3	40.6
	100.00	40.8	

Overflow 2500 gpm, 1.83% Solids, 11.44 tons/hour.

Flotation Feed to Cells			Flotation Product	
	Wt. %	Ash %	Wt. %	Ash %
+ 40M	12.00	15.1	+ 14M	
+ 60M	39.28	22.7	+ 20M	0.08
+ 80M	18.80	26.1	+ 40M	6.68
+ 100M	13.00	34.2	+ 60M	36.08
- 100M	16.92	50.8	+ 80M	21.00
	100.00	28.9	+ 100M	14.56
			- 100M	21.60
				100.00
				11.8

Table II. Plant operating results through January 31, 1955



A 7-ft classifier cleaner is used to wash the No. 4 Buckwheat coal

to 20 percent solids and distributed to the Nos. 1 and 2 cells. Clean coal is removed from the first five cells,

Cone Cleaner	60.6%
Classifier Cleaner	46.6%
Flotation	52.3%
Slush	46.5%

Table III. Typical ash content of refuse from various cleaning operations

final refuse from the sixth and the float product of the sixth cell is returned to the first for recleaning.

No. 2 fuel oil and Hercules Yarmor

35) pine oil are the flotation reagents used. Clarkson Model E wet reagent feeders and a Denver-Lewers distributor dispense 120 cc of fuel oil and 40 cc of pine oil per minute to the conditioner and 60 cc of fuel oil and 40 cc of pine oil per minute to the cells. This results in an average consumption of 20 gal of fuel oil and 10 gal of pine oil per shift. When it is necessary to increase the ash, 140 cc of fuel oil and 50 cc of pine oil per minute are fed to the conditioner and 60 cc of fuel oil and 50 cc of pine oil per minute to the cells. This steps up average consumption to 26 gal of fuel

oil and 13 gal of pine oil per shift. Retention time in the conditioner is eight minutes. Air for frothing is supplied to the cells at a pressure of 12 to 13 oz by a Lamson blower.

Large storage tanks for the fuel oil and pine oil are located east of the plant. The oils flow by gravity to two 1½-in. Fairbanks-Morse rotary pumps and are pumped to reagent storage tanks placed to feed by gravity to the wet reagent feeders.

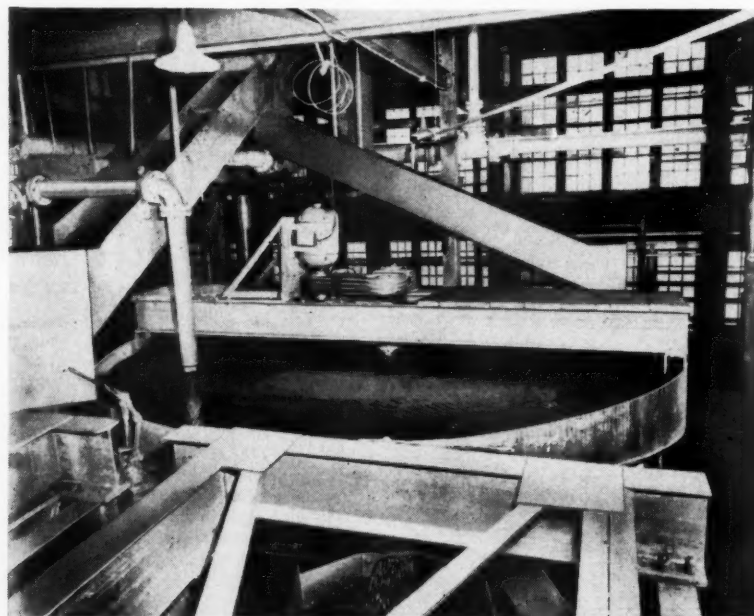
Flotation coal is directed from the cells into a sump, where it is picked up by a six-in., 1200-gpm, Hazleton "A" Type "CT" volute pump and distributed through a manifold to five 14-in. Heyl & Patterson cyclones. Underflow from the cyclones is dewatered on an Allis-Chalmers Low Head dewaterizer dressed with ¼-mm Bixby-Zimmer stainless panel surface. Final dewatering is accomplished by drainage in the loaded cars.

Water Supply

Of primary importance to the successful operation of the plant is an adequate water supply; one capable of sustaining operation even in long periods of drought. In order to insure such a supply, a section of a worked out deep mine was blocked off to form a main reservoir having an estimated supply of 175 to 200,000,000 gals. It was tapped by a 20-in. borehole approximately 220 ft deep. The borehole pump is a three-stage 16 M.C., 3500-gpm Fairbanks-Morse Turbine unit discharging into a concrete cistern built into a buffer reservoir and having a capacity of 5,000,000 gals. Water is pumped from the cistern 4000 ft through a 12-in. wood pipe line by a 10-in. 2500-gpm Hazleton Type "VS" pump to a plant reservoir. The plant reservoir has a capacity of approximately 4,000,000 gals. Both the borehole pump and the cistern pump are driven with 200-hp, 2300-v, 1750-rpm motors and rated at 225 ft total dynamic head. Provisions have been made to return clarified water from the refuse and waste impounding area to the buffer reservoir.

Clean water is supplied to the plant by two pumps installed on the ground floor inside the main building. They are fed by gravity from the plant reservoir. An 8-in. 2500-gpm Hazleton Type "CB" pump discharges to the main scalping shakers for diluting the feed to the plant. Underflow from these scalping shakers enters the plant coal feed sump pump. Any overflow from the main feed pump sump and any drainage from the loaded cars is diverted to an impounding basin near the plant. The solids and water are returned to the main feed sump by a 4-in. Hazleton Sand pump. A 6-in. 1100-gpm Hazleton Type "BS" Unit provides fresh water for sprays, control valves on the cleaning units and

(Continued on page 98)



The 16-ft classifier cleaner in which the No. 5 Buckwheat coal is cleaned



Present pit areas were recognized and extensively drilled 40 years before operation became a reality

Silver Bell Pit Development

Modern Truck Haulage and Advances in Milling Technology Make Mining of 0.9 Percent Copper Orebodies Feasible

By T. A. SNEDDEN

Manager, Southwestern Division
Mining Department
American Smelting and Refining Co.

THE Silver Bell 7500-tpd open pit operation of American Smelting and Refining Co. is located about 40 miles northwest of Tucson, Ariz., to the west of Avra Valley, at the southern end of the Silver Bell Mountains.

Development on the Silver Bell copper deposits began in 1873 on the Mammoth lode. In 1881, after construction of the Southern Pacific Railway through Tucson, the Huachuca Mining and Smelting Co. began mining rich oxidized copper ore from the Mammoth, Old Boot and Blue Coat claims. In 1882, four different companies operated in the district but were soon discouraged by transportation problems and low metal prices.

In 1891, Silver Bell Mining Co. built a smelter in Tucson and operated it intermittently. In 1902, the Imperial Copper Co. obtained the Old Boot, Mammoth, and other claims, developed a sizable ore body and built a railroad from Red Rock to Silver Bell, which they completed in 1904. During this period, several companies were organized, including Oxide Cop-

per Co., to develop the Young America Group and the Cleveland-Arizona Copper Co. (later El Tiro Copper Co.) to develop claims adjoining the Imperial and Indiana-Arizona Co. In 1915, American Smelting and Refining Co. purchased the holdings of Imperial Copper Co. and operated underground mines until 1919. In 1934, all machinery, equipment and buildings were moved out, and Arizona Southern Railway from Red Rock to Silver Bell was dismantled. In 1940, the present operator acquired the property of the Oxide Copper Co., which had drilled 76 holes, and outlined a disseminated copper deposit between 1909 and 1912. During those early days, the ore was considered too low grade to be commercial. During this same period, Imperial drilled 87 holes in the El Tiro area and adjacent to the area Silver Bell will mine. The El Tiro area is the second pit area of the present operation.

A number of estimates were made for opening up the property, but because of the relatively low tonnage

of the deposit any possible program did not seem attractive.

In 1948, a camp was established to accommodate crews for check drilling and additional exploration work. This work further increased the reserves and made it possible to enter into an agreement in November 1951, with Defense Material Procurement Agency. This agreement provided for complete financing by the company and a floor price of 24½ cents per lb of copper, subject to adjustment for increased operating costs, for 177,000,000 lb of the first 197,000,000 lb produced.

The unusual feature of the above history is that both of the present pit areas, the Oxide and the El Tiro, were recognized and extensively drilled some 40 years before the present operation became a reality.

Geology of Orebodies

All of the early mining in the Silver Bell district was in replacement-type ore bodies. The present production will be from porphyry-type ores occurring in two deposits known as the "Oxide" and "El Tiro" ore bodies. These bodies are spaced some two airline miles apart, with a northwesterly trending zone of hydrothermal alteration several miles in length. Alaskite, dacite and monzonite porphyry, with minor andesite dikes parallel to the alteration zone, have been enriched by supergene chalcocite to form the two ore bodies.

The Oxide pit obtains its name from

a claim in the district, not from the type of ore. The Oxide ore body is saucer-shaped, varying in thickness from 100 to 200 ft beneath 100 ft of leached capping. Dimensions are 1500 ft by 2100 ft.

Additional details on geology can be obtained by referring to "Structure and Mineralization, Silver Bell," by Kenyon Richard and J. H. Courtright, A.I.M.E., New York, February 1954.

Work Done by Contractors

To get the stripping work started more quickly, without waiting for the delivery of excavating equipment and also because of the relatively short life of the property, it was decided to do the preliminary stripping work by contract. The stripping contract was awarded to Isbell Construction Co.

All construction work was also done under contract. The camp was built by Utah Construction Co., and the mill by Stearns-Roger Manufacturing Co.

Strip Over 15,000,000 Tons

Stripping at the Oxide pit was started late in December 1951, and built up from 4000 tons that month to over 500,000 tons the following May. By May 1953, a rate of 1,000,000 tons per month was reached. At that time two six-yd shovels, one three-yd shovel, seven 24-yd trucks, seven 15-yd trucks, six churn drills, one rotary drill, three D-8 caterpillars, one DW-10, one grader and various service trucks were in use.

During preliminary stripping operations, a drainage dike to the north of the pit was constructed with 3,000,000 tons of waste from the several higher benches on the north and east sides of the pit area. Another 2,000,000 tons was moved to the east of the pit area, and the balance of the waste and oxidized material was moved to the southwest of the pit. Topography was such that over 90 percent of the waste was disposed of within 100 ft of its original elevation, even though waste was stripped over a vertical range of 400 ft. All waste disposal road grades were held under seven percent. The average length of haul has been 0.8 miles, with only a small tonnage being hauled over one mile.

Stripping was started at El Tiro pit in 1953, and it will eventually be brought into production to provide about half of the daily tonnage from each pit. When the mill started operating in March 1954, 13,500,000 tons had been stripped at the Oxide pit, and 2,000,000 tons had been stripped at El Tiro.

Pit Layout

The Oxide pit has been laid out on a $1\frac{1}{2} : 1$, or 56° slope. The shape and size of the ore body governs the

selection of this slope in that the 19,800,000-ton reserve would be decreased 1,800,000 tons if the back slope was decreased to 50° . The rock is reasonably firm; there are no known faults parallel to the perimeter, and the pit life is comparatively short (12 years), so little difficulty from slides of rock is expected with the $1\frac{1}{2} : 1$ slope.

A bench interval of 30 ft was planned originally but this was changed to 40 ft. The main reason for this change was to permit the contractor, Isbell Construction Co., to use their six-yd electric shovels to better advantage. Some of the lower benches will be mined on the 30-ft interval.

Haulage Road Paving

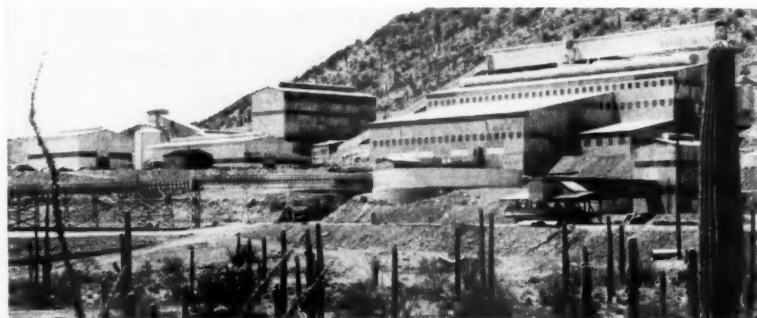
The haul from the second pit, El Tiro, will be four miles from pit perimeter to the mill. The haul and the paving of the road afford some very interesting problems.

The sub-grade for this road was formed for one mile on each end with waste from the two pits. The two-mile central area was brought to grade by balancing cuts and fills. A maximum grade of two percent has been maintained.

In order to obtain low truck maintenance, good tire cost, and avoid con-

tinuous sprinkling and grading, we will pave the El Tiro road before any ore is produced. Since the base of our road is all rock or, in effect, select material, one road expert has advised that in his opinion a two-in. single course road mix, properly laid and sealed will give us a road that will stand the desired traffic and last for the life of the pit. Another expert has recommended that we develop a one-in. surface using 0.5 to 0.6 gal per sq yd, with a penetration coat of MC-1 bituminous binder, sealing with about 0.33 gal of SC-66 and 25 lb of $\frac{3}{8}$ -in. to 10-mesh chips. He points out that this would be an inexpensive application, and a year or two later could be reworked to develop a thickness of about two in. Study is still in progress and final specifications have not been determined.

In summary, the two ore bodies have a reserve of 32,000,000 tons, the majority of which are in the Oxide ore body. The average assay of the two pits, four miles apart by road, is 0.9 percent copper. The combined stripping ratio for the two pits is 1.2 waste to 1 ore. Present pit equipment with truck haulage and modern milling practice, make the operation feasible.



The Silver Bell mill is a model of modern plant design



Originally benches were planned at 30-ft intervals. This was changed to 40-ft to accommodate six-cu yd shovels



There is a long story behind this cargo of coal being unloaded in Cincinnati

Wide Variations in Natural Conditions Dictate Different Approaches to Make Mining Costs Competitive

By W. F. DIAMOND

Chief Engineer
Island Creek Coal Co.

Full and Partial Mining

ISLAND Creek Coal Co. and its associate company, the Pond Creek Pocahontas Co., operate 11 mines in southern West Virginia and one in eastern Kentucky, producing 900,000 tons of coal per month from nine seams ranging in thickness from a minimum of 28 in. at the Marianna property to a maximum of 88 in. in Island Creek Mine No. 7.

As might be expected with such a variety of thicknesses there is considerable variation between mines as to equipment used and mining systems followed. This article is limited to a discussion of two of the operations only, the first practicing full extraction under a good roof and the second partial extraction under an extremely difficult roof.

cars were ruled out and sectional haulage is still done by battery powered gathering motors.

Mining on Block System

The mine is being worked on a block system with entries and cross-

FULL EXTRACTION IN HIGH COAL

Bartley No. 1 mine, located in McDowell County in southern West Virginia, is operating in the Pocahontas No. 4 Coal Seam, which averages 60 to 78 in. thick. The immediate roof consists of a coarse grained sandstone 40 to 80 ft thick and total overburden varies from a minimum of 750 to a maximum of 1500 ft over the property. A typical stratigraphic section is shown in figure 1. The excellent roof makes it unnecessary to use anything but safety posts with an occasional cross bar in advance mining. Some roof bolting has been done in limited areas where poor roof has been encountered, but the high bit cost and a slow drilling rate has ruled roof bolting out for any except very special applications.

For years the mine has been fully mechanized with crawler mounted loaders, shortwall cutters on rail trucks, and hand-held electric drills. The mine is extremely gaseous and until recently all of the equipment including sectional and main line haulage was battery powered. Now, however, underground rectifiers and feeder cables have been substituted for the batteries and the mine is operating with crawler-mounted loaders, universal track-mounted cutting machines and hand-held hydraulic drills. Power is supplied by three-conductor trailing cables from permissible safety load centers. Because of the high rate of methane liberation and the need to maintain absolute control of the ventilation at the working face, shuttle

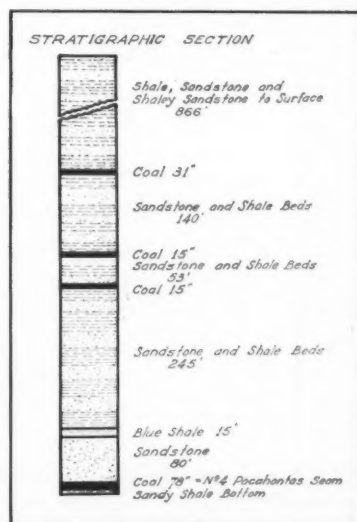


Fig. 1—Typical stratigraphic section overlying the Bartley No. 1 mine

cuts on 85-ft centers. All headings and cross-cuts are driven 20-22 ft wide. Approximately 45 percent of the coal is recovered on advance mining and an additional 40 percent of the original coal in place is recovered on retreat, giving an overall recovery of 85 percent. The recovery would be much better but for the fact that the high rate of methane liberation makes it mandatory that two full blocks are left intact around each area being pillared to provide bleeder entries and to give positive control of the ventilation across the active pillar line. Figure 2 is a map of a portion of the mine showing a pillar section and the blocks left to protect bleeder entries.

After a section, which consists of seven or eight entries or headings, is driven up the projected distance, the equipment is moved over 85 ft and a new group of seven or eight places advanced parallel to the first set. When this second set of places reaches the projected distance the pillaring is begun in the first group of entries driven.

On advance mining all breakthroughs were cut on 85-ft centers except between No. 2 and No. 3 entry and between No. 6 and No. 7 entry on an eight entry system or No. 5 and No. 6 on a seven entry system. The breakthroughs excepted above are cut on 170-ft centers reducing the number of permanent stoppings required between the intakes, which are at the center of the group of entries, and the two return entries which are maintained down the outside of each group of entries. As pillaring progresses these blocks are split, the split being driven 20-22 ft wide. The two blocks formed by this operation are

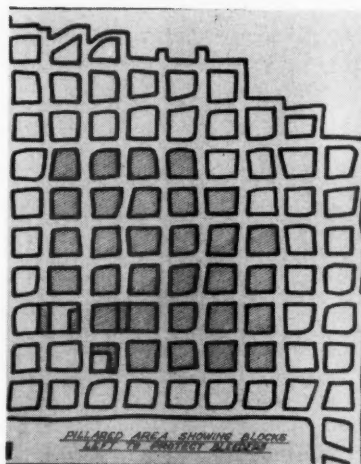


Fig. 2—Because of the high rate of methane liberation at Bartley No. 1, bleeders have to be well protected

the same size as all of the other blocks in the area. This splitting operation is kept 400 to 500 ft ahead of the advancing pillar line.

Cribs for Roof Support

The pillar extraction pattern used results in the establishment of a 45° fracture line. In preparation for the start of pillaring each of the blocks to be mined is cribbed on two sides with cribs set on 10-ft centers and made up of 5 by 5 by 18-in. blocks. These crib blocks are cut from native woods and both hard and soft woods are intermixed at random in the cribs. Not only are cribs built around the actual blocks to be mined, but all of the blocks in the first four rows out by the pillar line are similarly cribbed.

Figure 3 shows the actual crib pattern for a block before extraction is started while figure 4 shows the crib pattern for a portion of the pillar line. Individual blocks are attacked open ended, with lifts being taken in a definite sequence as illustrated in figure 4. Wherever possible the first lift is taken off the block in such a way that the operator has the machine between himself and the rib in case a bump or rock burst should cause the rib to turn over. Only one lift is worked at any one time. Cribs on 10-ft centers are built along the newly exposed rib on the block as the open end face is advanced. A fall generally occurs shortly after a lift has been completed, the roof breaking off on a 45° line on the cribs and corner of the block, with the soft wood blocks in the cribs in the gob, crushing under the weight and allowing the cribs to kick out. Sometimes the first fall is of a minor nature in which case the major fall occurs within the next two shifts, but generally the first fall is a major fall. Under the extraction plan followed three or four blocks are worked at a time until all of the coal has been completely removed, at which time the extraction cycle is started on the next three or four blocks on the line. The pillar lines at times have been as long as 30 blocks and have been worked by two double shift sections.

Don't Cut Coal

An unusual feature of the pillar extraction system at this mine is the fact that undercutting of the coal is only necessary when the pillar line is being established. Once the line is set up and roof falls begin, the pressure on the blocks becomes so intense

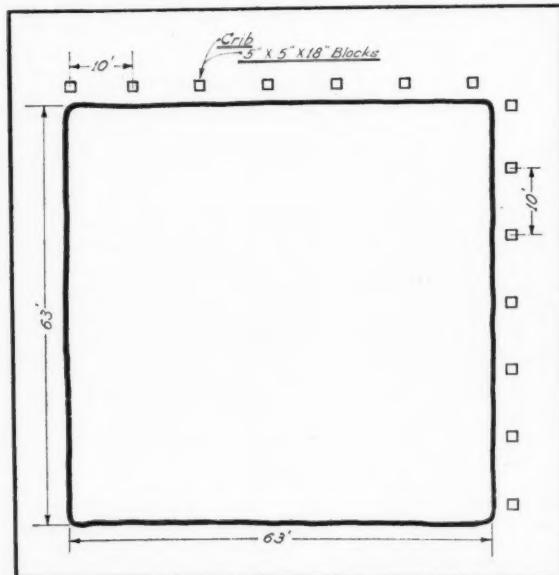


Fig. 3—Crib pattern for individual blocks

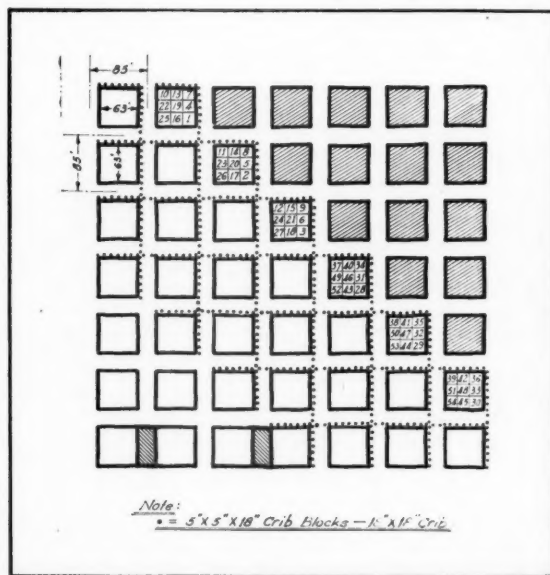


Fig. 4—Portion of the pillar line showing typical crib pattern and sequence of cuts

that the coal, which is extremely friable, is crushed by the weight and has only to be loaded. The sketch of a typical pillar extraction pattern illustrated by figure 4 indicated that a lift 21 ft wide and 63 ft long was taken in three passes which is not at all unusual. Frequently the loader can advance the lift as much as 40 ft at a single pass before the coal becomes too firm to be loaded. The machine is then moved to the next block to allow sufficient time for pressure from the roof to further crush the coal in the block.

Principles to Follow

The system being worked at this mine has been developed after years of experimenting and much trial and error. The experience gained through these years of work and study indicate that to produce consistently good tonnage at a reasonable cost, from the pillar sections, there are certain principles which must not be violated. These are summarized briefly as follows:

- (1) The pillar line must be kept straight.
- (2) All of the coal must be removed—no stumps can be left to cause a shift in the weight.
- (3) Cribs must be used to provide a yielding support so as to prevent a sudden collapse of the roof. Insofar as possible, the use of posts on the pillar line is avoided.
- (4) Development work must be kept well in advance of the pillaring operation.
- (5) Open end lifts must be used in extracting the pillars and more than one lift is not worked off a pillar at any one time.
- (6) Blocks are kept uniform in size

and large enough to support the weight while advance mining is being carried on.

- (7) Oversize pillars, which are advantageous on development, must be reduced to the size of

the regular blocks well in advance of the pillaring operation.

- (8) And last—although it should probably be first—the supervision on pillar line work should be of a very high order.

PARTIAL MINING IN THIN COAL

The Elkhorn No. 3 mine, located in Breathitt County in eastern Kentucky, is operating in the Elkhorn No. 3 Seam, a high volatile metallurgical quality coal which averages 28 to 40

in. thick. The immediate roof consists of thin layers of shale with irregular streaks of coal $\frac{1}{8}$ to $\frac{1}{4}$ in. thick. Cleavage planes in this strata make various angles with the hori-

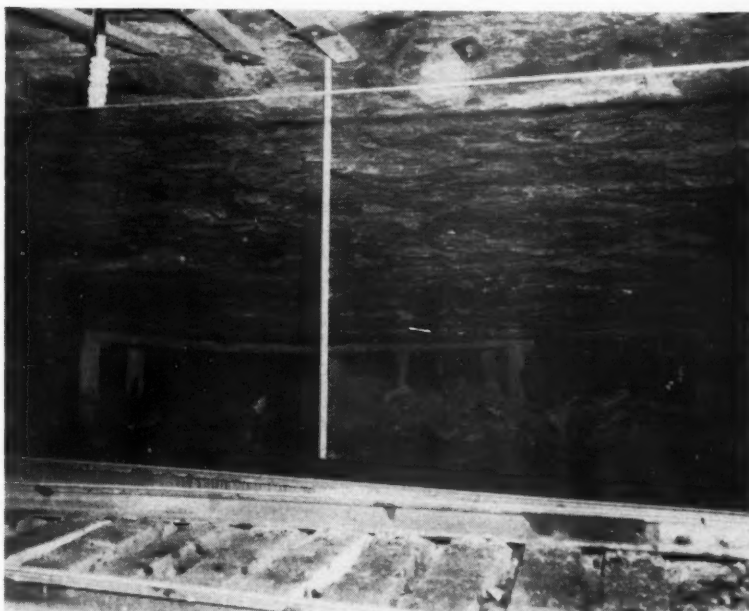


Fig. 5—Strata immediately over the Elkhorn No. 3 coal seam consists of thin layers of shale and coal



Fig. 6—A rotary drill is used to put in roof bolt holes

zontal at some places being as steep as 45°. The shale and coal streaks is overlain with an 8 to 10 in. thick rider seam of coal which undulates over the main seam in the area developed over to date.

The roof has very little body and emits a drummy sound when tested immediately after removal of the coal. A photograph of the strata over the seam is shown in figure 5.

Top Is Poor

The mine, which went into production in May 1950, was originally projected as a mobile loader shuttle car mine, but roof control difficulties quickly ruled out this type of production equipment. Bolts were used in an attempt to control the roof, but the spans necessary to provide the minimum side clearance for the mobile equipment would not stand. The roof would separate at the bolt anchors and the faces cave in every four to five cuts. In an attempt to overcome this difficulty, sectional roof



Fig. 8—Loading out coal in a 28-40-in. seam

bolts and sectional drill steel was used to anchor the bolts higher in the strata, but this proved to be of no avail as the roof continued to separate at the bolt anchorage and cave in as before. Management then switched to cross-bars in an attempt to overcome this difficulty, but when a bar thick enough to support the roof was used, the vertical clearance was reduced to the point where the

equipment could no longer pass. When thinner cross-bars were used the roof separated over the span between the cross-bar legs and bowed the bars to the point where vertical clearance again was reduced to less than the minimum required by the equipment. It was then decided that mobile equipment could not be used and the mine was converted to a self-loading shaker conveyor operation.

The shakers dumped into chain cross conveyors which in turn dumped onto a belt and then into the mine cars at the butt entry mouth. This permitted much better control of the roof and reduced the width of the openings which had to be maintained for clearance of the equipment. A rigid timber standard was worked out and adopted which included the setting of two cross-bars for each cut of coal removed. In the area inby the swivel section each bar was supported on four steel timber jacks while outby the swivel each bar was supported on four wood posts. In addition to the posts under the bars, an additional post with a small cap block was set between the end of each cross-bar and the rib.

Try Bridge Conveyors

This system was followed with considerable success for several years. With the increase in competitive conditions within the industry it became evident that some method would have to be evolved that would yield a higher tonnage per man than could be obtained from the shaker conveyors, and at the same time take some of the manual labor out of the operation.

It was realized that any change in mining equipment would only be successful if a roof support system could be developed to work with it. Remembering the difficulty experienced trying to work mobile loaders and shuttle cars in the mine, it was decided the best hopes of achieving the goals of lower costs, less manual work and higher tons per man lay in the use of bridge conveyors or piggybacks coupled to a mobile loader. The bridge conveyors and loader were decided upon because the spans that would have to be held open were only a little greater than that required by the self-loading shaker conveyor, but the production potential was much higher. A single section of equipment consisting of two room chain conveyors, a chain cross conveyor, two Piggybacks, and a Long 88 Pigloader, a high capacity loading machine especially designed for work with Piggybacks in close posting, was set up and the experimenting with roof control systems started. Because of the thin seam and very hard coal it was necessary to maintain all of the vertical clearance possible over the loader. This ruled out the possibility of using cross-bars for support, so the thinking turned again to roof bolts. It was recognized that bolts could not be relied upon as permanent support for the roof, but management hoped to develop a system in which roof bolts used in conjunction with steel timber jacks and cap blocks would sufficiently support the immediate face area. Loading and preparation operations could then be carried on with a minimum of interference, and at the same time bolting could be fol-

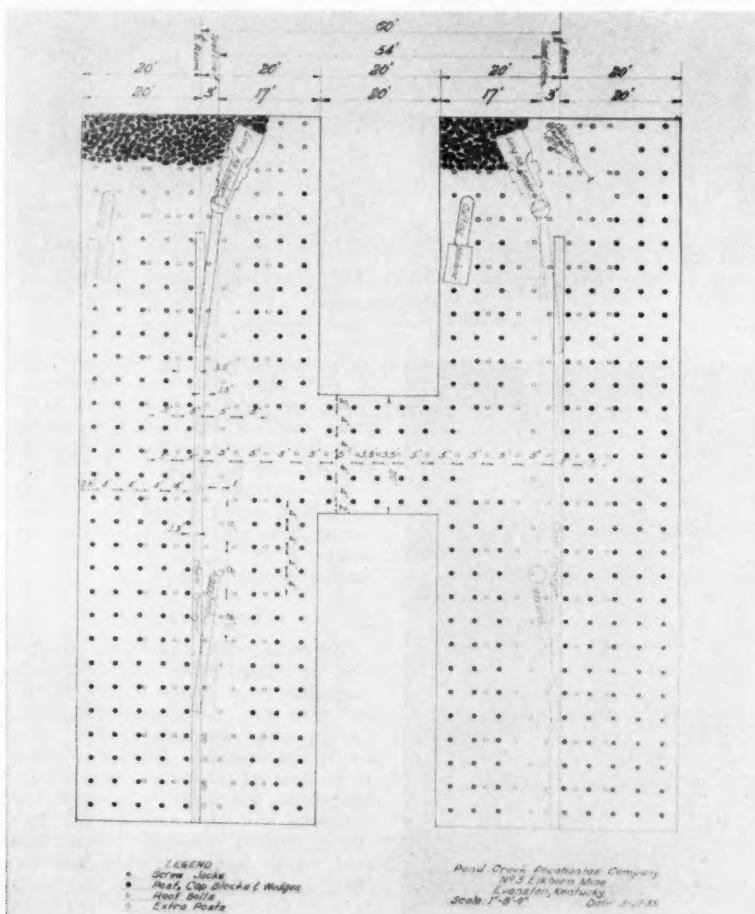


Fig. 7—Timbering standard for use with "Piggybacks" in 40-ft rooms



Fig. 9—A total of 25 steel timber jacks is used in the face area

lowed with a rigid system of permanent wood posts immediately outby the active face area. To drill the holes for the bolts and to tighten the bolts once they were inserted in the holes, a small, electric powered rotary roof drill was purchased. Figure 6 shows the machine at work at one of the producing faces.

Bolt and Timber

To make certain that separation of the roof strata was held to a minimum as the coal was removed, the roof bolting operation was integrated into the complete cycle in such a way that bolting and loading could be carried on in the same place simultaneously. The bolting crew followed the loader crew across the face as the cut was cleaned up. The loading cycle was set up to clean the face from right to left so that when the loader had completed the clean-up at the left rib, all but one bolt would be set. After considerable experimenting with the number of posts and bolts to be used per cut, and the pattern that would provide the best support, the system illustrated in figure 7 was adopted.

With this system six bolts are installed per cut, five being set in a line astraddle the roadway and the sixth in the center of the roadway approximately four ft from the row of five. In addition to these, a total of 25 steel timber jacks with wood cap blocks are used in the face area and 18 posts are set per cut just outby the active face area. These are set in two rows with the rows approximately four ft apart. The timber standard illustrated is for room work with the same standard being used in entries except that five bolts and 14 posts are set per cut, and the faces are driven 12 ft narrower. Figure 8 shows the loader at work loading out a fall of coal, showing some

of the steel jacks used in the face area to protect the operator and machine. Figure 9 shows the bolts and steel timber jacks in a portion of a working face as they are left for the cutting machine crew who follow the loader.

Experience with this support system demonstrated that the roof could be successfully controlled and the Pig-loaders and piggybacks, were then substituted for shaker conveyors throughout the mine.

As might be expected the changes in equipment made at this operation necessitated some changes in mining system.

Mining Plan

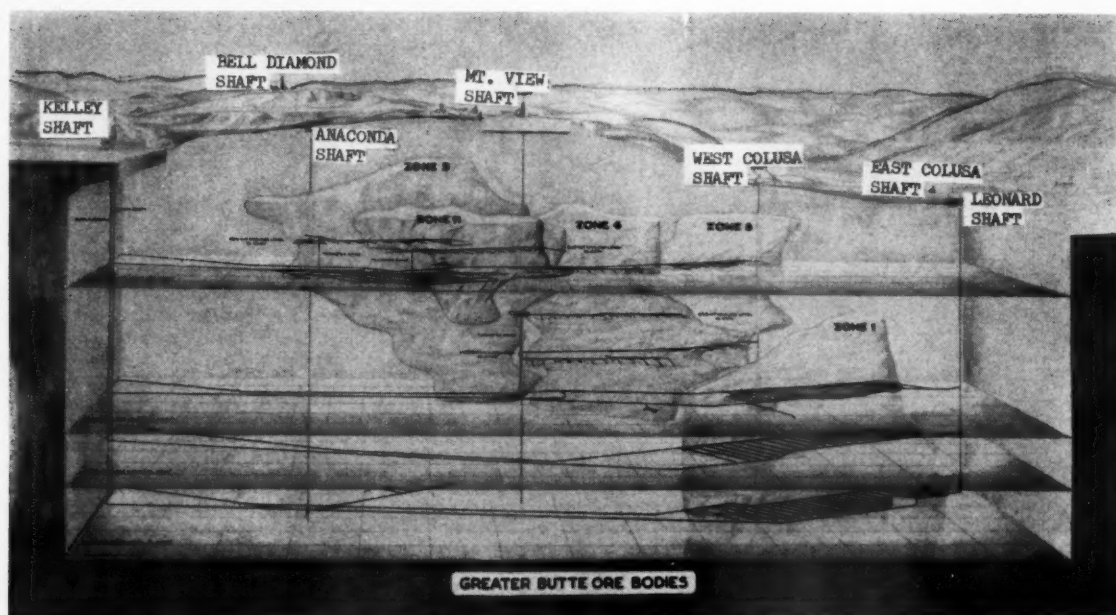
Basically, the overall mine projections have been changed very little. Experience gained in operating the mine as a shaker operation plus the slight increase in flexibility obtained with the mobile loader piggyback system, has permitted such changes as driving wider rooms, deeper than was possible with the shaker conveyor units.

The mining method followed is a room and pillar system with no recovery of the room or butt entry pillars. The mains and flat entries consist of eight headings each being driven 28 ft wide on 60-ft centers with four heading butt or panel entries being turned right and left off the mains or flat entries at 880 ft intervals. The butt entry headings are driven 28 ft wide on 55-ft centers to a depth of 2400 ft with rooms turned in pairs right and left on retreat and driven 40 ft wide on 60-ft centers. This system results in panel entry recoveries of 70 to 72 percent of the coal in place. Experience gained while operating the mine with shaker conveyors indicates that this is the maximum recovery obtainable with a partial extraction mining system if squeezing is to be avoided.

The combination of the roof support system developed to work with the new equipment together with the mining system employed have enabled the company to meet tonnage and cost objectives for this operation, placing it in a position to compete successfully with other low cost producers in the markets served by this coal area.



"Wonder if I could get off a little early this afternoon, boss?"



Greater Butte ore bodies will supply 160,000,000 tons of ore by block caving methods

The Greater Butte Project

Six Million-Ton Production Experience Proves Block Caving Can Be Applied Successfully to Remining Stopped Ore Zones

By M. K. HANNIFAN

Assistant General Superintendent
Kelley Mine, Anaconda Copper Mining Co.

THE Kelley Mine located in Butte, Mont., is the Anaconda Copper Mining Company's newest caving method mine. It is preceded by about 39 years and over 260,000,000 tons of block cave mining experience by this company at the Inspiration, Ariz., and Andes Copper in Chile.

General characteristics of the ore zones of the Kelley Mine are quite different to those of ore bodies mined elsewhere by the caving method. The purpose of this paper is to describe some of the problems encountered and the methods developed to improve efficiency since the start of production in January 1952.

Greater Butte Project plans involve the application of a block caving method to an estimated 130,000,000 tons of ore containing 20 lb of recoverable copper per ton and minor amounts of gold and silver. This ore is located above the 3400 level in the area of such well known shafts as the Anaconda, Mountain View, St. Lawrence, West Colusa, and Rarus, whose mining history covers over 65 years of selective stoping. Extensive exploratory sampling work was done from 1943 to 1946. This information, to-

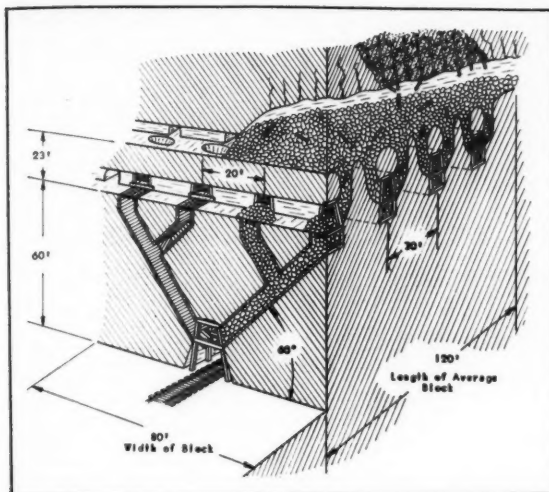
gether with the maps and records kept by the Engineering and Geological Departments, of past operations in the area, outlined 12 ore zones minable by block caving. These ore zones are 100 to 400 ft wide, up to 1500 ft long, and from 200 to several thousand feet in depth. Their dip varies from 65° to near vertical.

The mining blocks are located in the most intensely altered multi-fractured granite areas in Butte. They include back-filled stopes of various ages and sizes containing timber and rock fill along with recently introduced wet tailings. These so-called "gobs" constitute about 12 percent by volume of the minable ore estimate and contain appreciable copper values. The unstoped material between and adjacent to the larger veins contains smaller parallel vein structures and some disseminated copper. The ore zones are overlain by waste capping. This overburden varies in depth from 50 to 500 ft and in character from alluvium

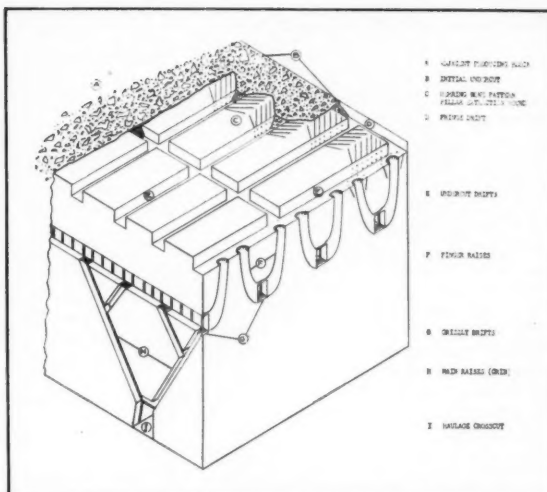
to leached vein material or wall rock in place.

Kelley ore may be classified as free caving but presents many problems because of its damp sticky character and the presence of much old timber. Some areas produce considerable blocky oversize material from the stronger footwall and hanging wall granite. Ground strength within the confines of the ore zones is generally low and all openings require support.

Sealed-off fires existed in part of the ore zones to be mined. Also, a potential fire hazard exists where remining will admit fresh air to any of the old stope areas. Thus it was necessary to precede block cave mining by an extensive program of fire elimination and prevention. A method of introducing wet tailings under hydrostatic pressure into the workings was used in preparing the Kelley Mine for block caving. Equipment, material, and know how was readily available for this job as much of it had been done in past years to control local underground fires. Three surface plants were built to mix tailings with water and deliver it by pipe underground. There the mixture, about 50



General layout gravity chute type block



Undercutting by horizontal development with retreating pillar removal

percent solids, is introduced through concrete bulkheads at strategic points until back pressure indicates that all voids have been filled. This work and the draining of excess water has progressed upwards in several shafts and to date 3,500,000 tons of tailings have been placed. About 3,500,000 more tons will be placed before completion of the project. This type of filling has eliminated the dormant fires, and most of the fire hazard in the areas to be mined by block caving. It has also effected considerable improvement in working conditions through cooling and ground support.

Plans call for an ultimate mining rate of at least 15,000 tpd to be achieved by mining simultaneously on two main haulage horizons. Two new shafts have been installed. A five compartment hoisting shaft is now 2731 ft in depth and lined with monolithic concrete for 1800 ft. A two-compartment service shaft is now 2175

ft deep and lined with concrete for 1700 ft. Production of 12,000 tpd is currently coming from the 600 haulage level. Two other levels, the 1300 and 2000, are partially developed and maximum production will be achieved in 1955, when the 1300 level goes into production.

Block Development

The general layout of a Kelley Mine gravity chute type block and its dimensions are shown in the accompanying drawing. The top half of the finger raises are coned during undercutting operations to a draw point which serves 300 sq ft of area.

Undercutting is accomplished by horizontal development, followed by pillar removal in a retreating operation.

Boundary weakening is a minor development job in general. Some weakening is done in blocks under dipping

veins where a section of hard foot-wall must be caved to assure the drawing of ore vertically above the boundary draw points. Butte ore zones have little ground strength as a result of fracturing during settlement of the wall rock adjoining the stoped out veins, so that arching and slow caving is improbable in most blocks.

The mining unit dimensions selected for the Kelley Mine were influenced by: (a) The character of ore and capping as related to block caving. To provide answers for some of the mining problems, three trial blocks were developed and 543,000 tons mined and hoisted through the Mt. View Shaft in 1945, 1946 and 1947, during the preliminary stages of the Great Butte Project. (b) Past experience with the method at other mines especially block size, drawpoint spacing and the design and support of extraction openings.



Concreted grizzly drifts were designed so all concrete is in compression

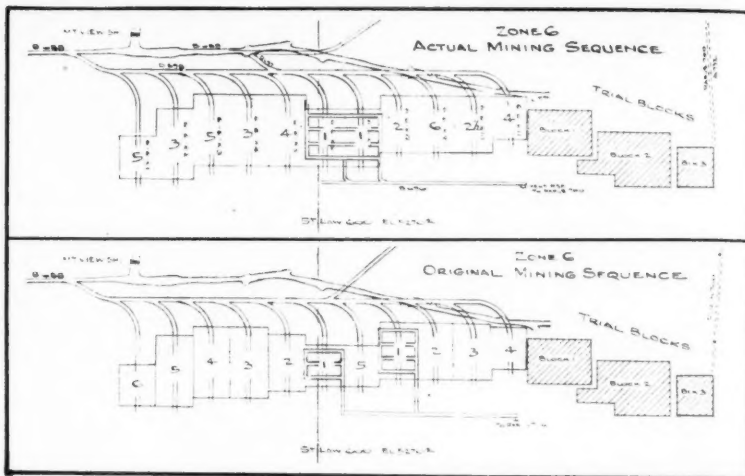


Flanged steel beam protects grizzly set cap

Sequence of Mining Blocks

In general the areal size and shape of an ore zone are the governing factors which limit the number of blocks that may be in production simultaneously. This in turn limits the daily production capacity of that zone. Kelley Mine zones fall into two classes according to their lateral dimensions: (a) Those which are of such size and shape that a single block unit extends from foot to hangingwall ore limits. These are planned so that two blocks are mined simultaneously, (b) Zones in which two or more block units are required to mine the width of the ore. These are planned so that three or four blocks are mined simultaneously, depending on the areal size and shape of the zone.

Original plans for mining a zone of type (a) above, were to undercut the two adjacent blocks located in the center of the zone and to retreat from these initial blocks successively in opposite directions along the strike. This plan would leave no pillar blocks to be mined, but each new block would have one side exposed to the unconsolidated waste of an exhausted block. Maintenance as a result of crushing is proportionately less in a block surrounded by four solid sides as compared to a block exposed on one or more sides to broken material because of increased resistance to shearing. For this reason it was presumed that the first undercut in a zone could be a double block area 160 by 120 ft without risking excessive maintenance caused by crushing. The grizzly level of these initial blocks, however, required heavy maintenance, indicating that the active area was too great. The next blocks undercut were separated from this active area by a pillar the width of a block (80 ft) and little maintenance caused by crushing has been necessary in these blocks.



Trial blocks showed original sequence would have to be changed

Other blocks have been undercut adjacent to an exhausted block on one side with little time for consolidation. These blocks required more maintenance than the 80-ft wide "Virgin" blocks, but considerably less than the initial double block area.

Insofar as the necessary sustained production will allow, mining sequence is now planned so that individual active areas within the zone do not exceed 80 to 100 ft in width by 120 to 150 ft in length. No more than one side of a producing block is exposed to unconsolidated waste, and waste adjoining a pillar block will have at least three months to consolidate before placing the block in production.

The damp sticky character of the ore and capping, which produces many problems in ore drawing does have the desirable feature of fairly rapid consolidation. This has an advantage in reopening work and minimizes dilution of ore in a producing block by

leakage of waste from an adjoining exhausted block.

Grizzly Level Support With Steel Caps

The supporting sets for grizzly drifts used in the initial blocks were difficult to maintain in heavy ground. More recent blocks have an 8 by 10-in. wide flanged beam grizzly cap. This type of support has proven fairly successful in combating crushing conditions, blasting damage, and boulder blows. It fails only when the minor jobs of relieving lagging, changing posts or replacing braces are not done soon enough.

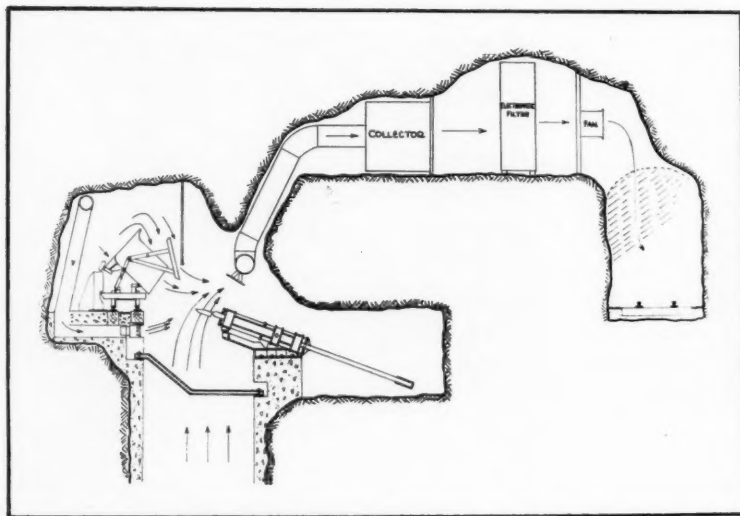
Concrete Support

Early in 1953 concrete support was tried in a block that adjoined an exhausted block on one side which had required excessive maintenance, with two or three complete changes of grizzly level support, during its productive life. During the development of the new adjoining block, crushing damaged some of the grizzly level timber support. This timber was removed, and the grizzly line formed of concrete by use of arched shape wooden forms. Results were so good that over 4000 linear feet of concreted grizzly drift has been installed since that time, and to date only minor maintenance caused by crushing of these openings has been necessary.

Ready mix is brought by truck from our own mixing plant, and delivered through pipe down the nearest shaft, or a churn drill hole, and placed in the forms with a pumperete machine. The section provides for an average thickness of 16 in. of concrete and it is designed so that all of the concrete is in compression.

Combination Slusher-Gravity Type Block

The lack of ground strength and presence of previous openings requires



Dust collectors at car dumps aid ventilation

that all main raises from haulage to grizzly level be supported throughout. The support is 5 by 10-in. cribbing having a clear opening of 4 ft by 4 ft. Little damage due to crushing has occurred, but the tendency of Kelley Mine ore to pack in these chutes and subsequent blasting needed to free them promotes inefficiency in car loading operations and frequent chute repairs. A combination slusher-gravity block has been installed which successfully solves this problem and has some other advantages. Its design is derived from the following observation:

(a) Car loading will not be interrupted by crushing and maintenance of the slusher drift when concrete is used for support and blocks are of a minimum size.

(b) The character of Kelley Mine ore precludes the tapping of ore from draw raises directly to the scraper drift while fulfilling the requirements of distributed drawing and continuous car loading. Therefore, the ore is fed to each scraper drift by chute tappers from grizzly level draw raises through short, 60° inclined, 4 by 4-ft cribbed down chutes. The number of chute tappers per slusher unit is balanced to provide sized ore in quantities for maximum scraper efficiency.

(c) Chute tapper efficiency is greatly increased by spacing the grizzly rails farther apart since larger material can be handled with this method.

(d) The drawpoint area has been reduced to 240 sq ft by locating grizzlies at 16 by 30-ft spacing. This will undoubtedly result in better extraction control in rapidly mined blocks, and reduced spacing is possible with this block layout without increasing weight and plugged raise problems.

(e) Other advantages gained by this block layout are:

Increased safety for loaders, better car loading with less spillage, and the elimination of down chute repairs caused by blasting hangups.

Haulage Chutes

A variety of loading gates adapted to the standard 36-in. chute jaws of the gravity chute type block main raise have been tried in an effort to improve the efficiency of car loading. Inspiration type arc gates, Mountain Con type strong-arm gates, air operated undercut, and overcut arc gates, and air operated undercut guillotine type gates, have been used.

The latter is the most efficient but has a comparatively high initial cost. For maximum loader efficiency, Kelley ore requires a gate that, when open, exposes the maximum unrestricted throat possible with a 4 by 4-ft cribbed main raise and 36-in. chute jaw, and leaves the loader's hands free to use bar or blowpipe. None of the hand operated gates tried effectively fulfill all these requirements.

Ventilation

Excellent results have been obtained from the installation of dust collectors at the car dumping pockets underground. These are of two types—the wet impact collector of local design and an electrostatic type filter. Five are presently installed underground and eight more are planned for future locations.

In the gravity-chute type block, a design has been developed which provides for a ventilation system that down casts the air throughout the grizzly level openings. This is accomplished by a sub-level ventilation drift connecting the junctions of the main raises to an exhaust lateral or an exhaust fan and dust collector unit. This method has been most effective in keeping fresh cool air at the chute tappers working place and successfully reduces the pollution of grizzly level air by air movement up dusty extraction raises and the swirling effect in running ore in a multiple raise system. Ventilation is good on the grizzly horizon at any location that is accessible even where crushing restricts the grizzly level air ways.

Conclusions

Kelley Mine, in 2½ years and 6,000,000 tons of production, has proven that block caving is successful as a mining method to be applied to previously stoped ore zones where the minable area as determined by the

mineral content has appropriate size and shape. The presence of underground fires and fire hazards in such ore zones can be successfully eliminated by a carefully planned and placed wet tailing fill.

The problem of incompetent ground and resulting heavy maintenance during ore drawing operations has been greatly minimized by the adoption of smaller producing areas, concrete support on the grizzly level, and fast mining.

Plugged main raises from haulage to grizzly level and consequent damage to chutes from blasting can be entirely eliminated by a slusher-gravity type block. Added advantages to this system are greatly increased chute tapping and car loading efficiency as well as better extraction control through reduced draw point spacing. The effectiveness of concrete support has made this type block possible, improved ventilation and ore drawing efficiency, and reduced maintenance and fire hazard.

Anaconda Copper Mining Co. is justly proud of the advances made in improving ventilation in Butte. The difficult problem of adequate ventilation in deep mines as well as controlling high ground temperature effects with underground coolers, has been successfully accomplished in the selective mines of Butte. The installation of dust collectors in the Kelley Mine is another important step in the field of underground air conditioning.



Air-operated undercut gates were most efficient but initial cost was high

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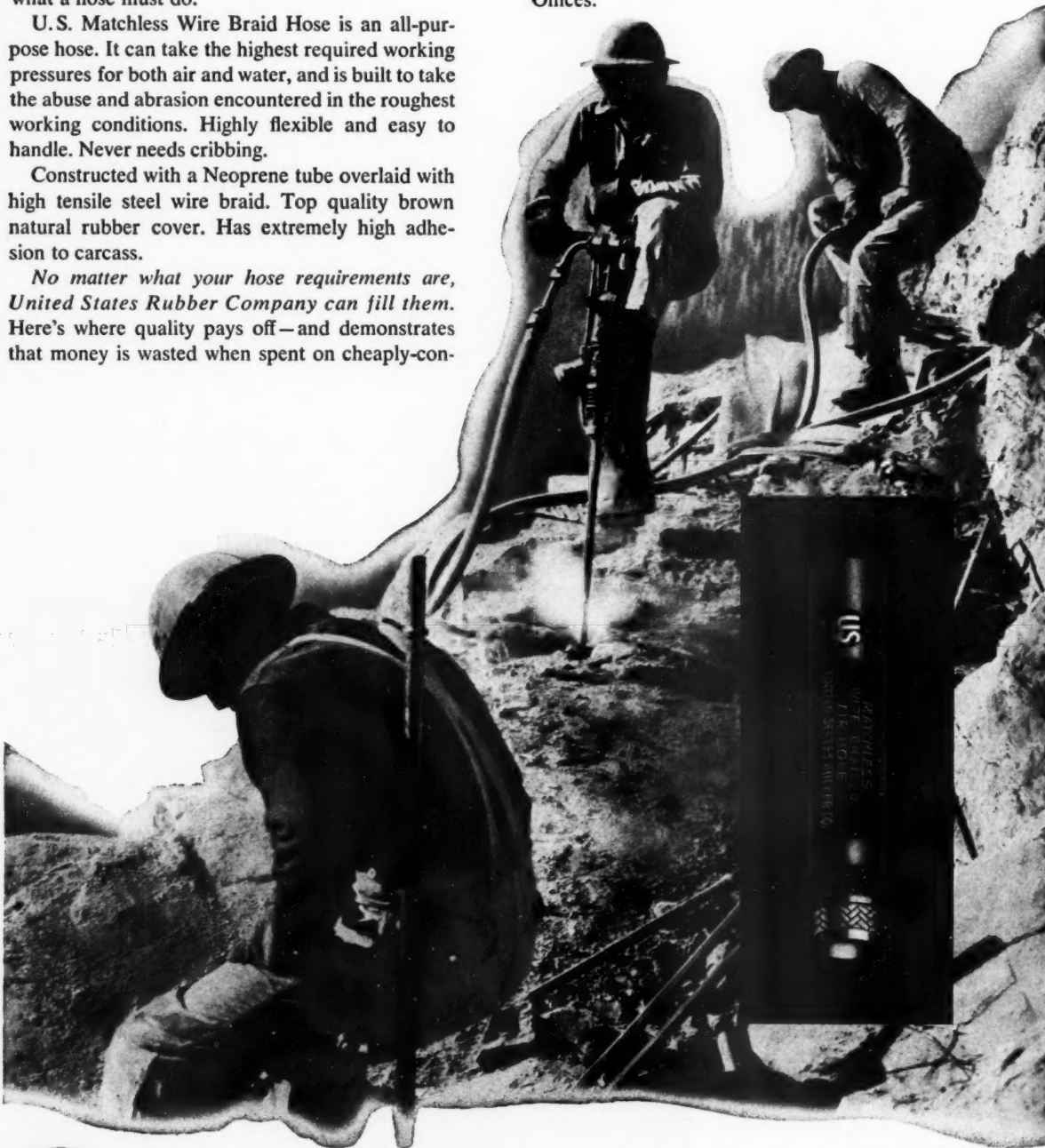
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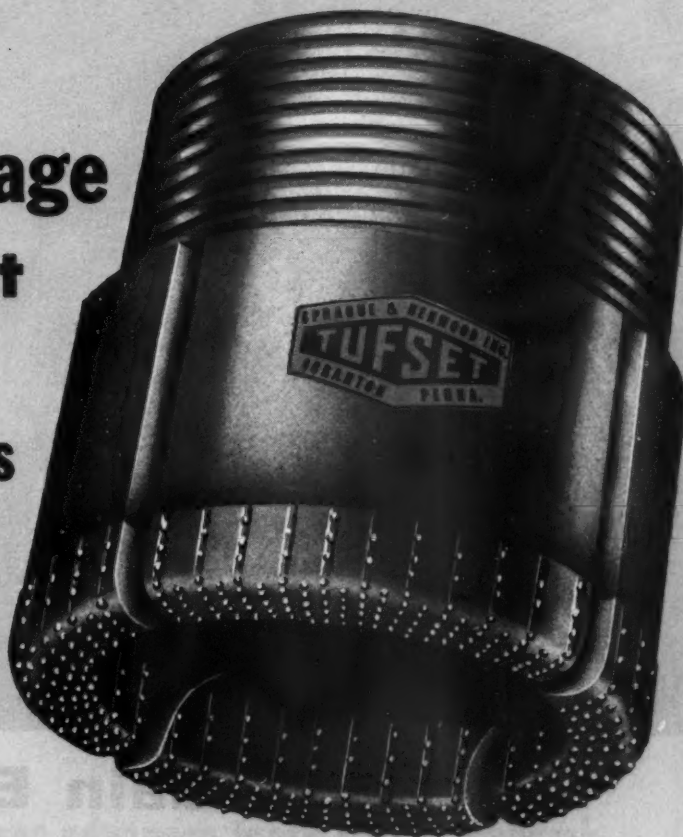


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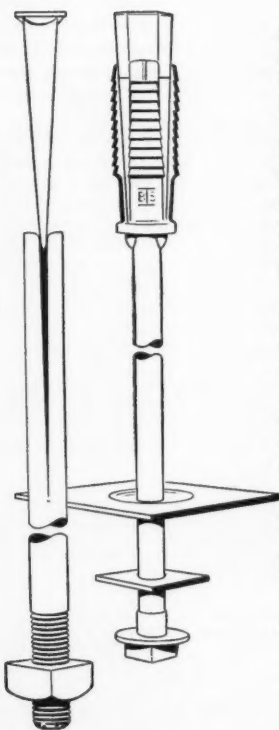
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You Gain Elbow Room When You Roof-Bolt



Safety is, of course, the No. 1 reason for using mine roof bolts. The bolts consolidate strata into a single-unit thick beam, which effectively minimizes the possibility of serious roof falls.

But roof bolts bring other benefits too—including a big gain in elbow room. When you take out old-fashioned, bulky supports and replace them with modern roof bolts, you automatically gain a lot of extra space. You have larger free areas in which to operate mechanical equipment.

Bethlehem makes four types of roof bolts, each designed to help operators obtain these improved working conditions, and increased safety.

SQUARE-HEAD BOLTS (Three Types)

Bethlehem makes a $\frac{3}{4}$ -in. carbon-type roof bolt, and a $\frac{3}{8}$ -in. high-strength roof bolt, each with a typical breaking load of 24,000 lb. Also a $\frac{7}{8}$ -in. high-strength roof bolt with a typical breaking load of 45,000 lb. Both the $\frac{3}{4}$ -in. and $\frac{7}{8}$ -in. roof bolts can be used with Bethlehem's matching-halves Type F expansion shell, or with the 4-leaf Type C expansion shell. The $\frac{7}{8}$ -in. roof bolt is intended for use with the Type F shell only, in a $1\frac{1}{2}$ -in. hole.

HARDENED WASHERS. Bethlehem makes several sizes of hardened washers for use with headed roof bolts. The washers reduce the friction between the bolt head and roof plate which occurs when high tension in the bolt produces excessive bearing pressure. When this washer is used, there is no danger of galling or tearing of metal with pneumatic impact wrenches.

SLOTTED BOLT. This bolt, 1 in. in diameter, has a centered slot which is made by forging. No metal is lost in the forging operation. Opposite end of bolt has 5 in. of rolled threads. Bolt is supplied with steel wedge, which is started in slot when bolt is placed in hole. When bolt is driven in $1\frac{1}{4}$ -in. hole, wedge is forced deep into slot, expanding the bolt-ends. Truncated-cone point prevents damage to threads. Bolt is normally furnished with American Standard Regular Square Nut.

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Unretouched frame from Hughes Research Film showing explosive effect as heel tooth penetrates formation.

Hughes advances tooth action research

Knowing exactly what happens when bit teeth bite into the formation is essential in perfecting bit design. Every means that will clarify tooth action is used by Hughes engineers. This includes the study of bottom hole patterns, data obtained from millions of bits run on thousands of oil drilling rigs, and motion pictures taken with super high speed camera equipment.

Even small improvements are important in rock bit tooth action.

A design change that leads to the removal of 1/64" more formation on each revolution of the bit can increase the penetration rate approximately five feet per hour.

The study of tooth action is part of HUGHES' overall research program dedicated to the idea that improvement is a continuing process.



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The Class "Y" compressor offers everything a good compressor should have for heavy duty service: high overall efficiency, long life with minimum maintenance; smooth, quiet operation, accessibility and simplicity, compactness and ease of installation. With one-piece frame, it is shipped intact, including a flange-mounted motor—truly a "package" type unit. Built in sizes 75 to 250 H.P., it is available in single and multi-stage designs for pressures up to 5000 pounds, with belted, coupled or flange-mounted motor drive.

Simplate Valves, efficient and easy-to-clean shell-and-tube intercooler, multistep capacity regulation, roller main and precision type connecting rod bearings are some of the reasons for the big compressor performance of these medium size machines.



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Trackless Mining

(Continued from page 35)

diesel engine. A second type was powered with the General Motors 2-cycle diesel engine. There has been no difficulty with either engine. For our application, better performance is obtained from a third type of dump-truck, the Koehring Dumptor 5.25-yd capacity. The chief advantages have been:

- (1) The saving in time, both in spotting and dumping, in confined working areas;
- (2) The sturdier construction to withstand heavy usage and the impact of overhead loading, and
- (3) The saving in tire cost per ton. Dual wheels have cost from 7 to 9 cents per ton hauled, whereas the large single wheels have cost about 3.5 cents per ton.

Recently, a semi-trailer type unit was purchased—a Caterpillar DW-10 tractor, coupled to an 8.5-cu yd Landis end-dump wagon. Because of its higher capacity, lower costs per ton hauled are expected, but it will be impossible to use it to full advantage in driving pilot headings because of the turning room required. It is most useful on production haulage in larger openings.

Ventilation

Use of diesel equipment underground is new to British Columbia. The B. C. Department of Mines has been most cooperative and have been guided by the recommendations of the U. S. Bureau of Mines. A minimum of 75 cfm of air is required for each diesel horsepower in operation. This has been supplied mechanically, drawing fresh air from ventilation raises. Headings are served by 30 in. diameter tubing both rigid and flexible.

Mining Costs Reduced

For a similar application the use of diesel-powered equipment is recommended. It has reduced our mining costs from \$2.07 to \$1.42 per ton mined. Completely detailed cost data have been most useful in the reductions made to date.



JUNE, 1955

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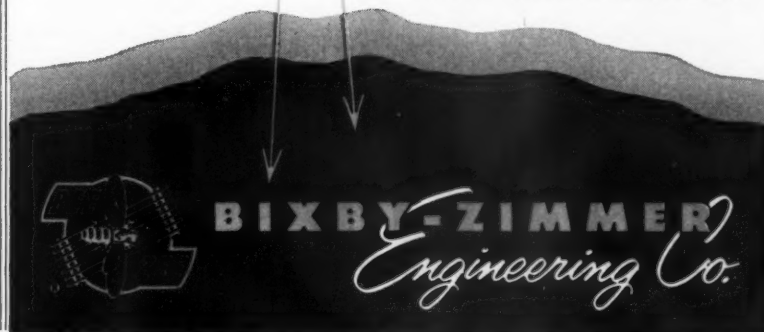
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Should you change wire rope constructions?

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But what about other conditions, the tough job, the unusual job? Suppose abrasion becomes a bigger factor, or unusual strength is needed, or more flexibility? Is a change of rope type in order?

Take a power shovel, for example. Moving dirt, sand, gravel, ore, it works fast handling smooth loads. If it is on a long job of clearing large rock, however, it will move slower and receive heavy jars and shocks. A different Red-Strand wire rope con-

struction will probably absorb shocks better and last much longer than ordinary types.

Take *your* equipment for another example. Whatever your business and however you use wire rope—if unusual conditions arise call in your Leschen technical man. Leschen makes all types, knows the special advantages and qualities of every one, and can help you choose the rope that will do your job best—on shovels or any type of equipment. Leschen's Hercules Red-Strand wire rope is working profitably in every industry.

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223 exhibitors used three acres of display area to show their products to the mining public

1955 Coal Convention and Exposition

Highly Successful Coal Show Mirrors Industry Optimism

THE eyes and ears of the coal industry were again focused on Cleveland, Ohio, during the week of May 16 as some 12,000 mining men gathered from all parts of the nation for the 1955 Coal Show of the American Mining Congress. Manufacturers and suppliers of mining equipment once again outdid themselves in presenting a display of coal mining machinery that can only be classified as the most outstanding in the world.

Attendance at the technical sessions exceeded expectations, dramatically driving home the point that the industry is continually on the lookout for ways and means to cut production costs. The Program Committee for the 1955 meeting, under the able direction of Hugh B. Lee, president, Maumee Collieries Co., had put together a program which had something of value for all. In addition to the many coal miners present, there were a large number of representatives from metal and nonmetallic

mining areas who came, "to learn how the coal industry does it."

Campbell Opens Convention

The convention program was opened Monday morning by L. C. Campbell, chairman of the AMC Coal Division, and vice-president, Eastern Gas & Fuel Associates. He commended the equipment manufacturers and coal operators who are striving valiantly to keep coal mining strong. He pointed out that coal has stood shoulder to shoulder with the men in the trenches during two World Wars and the Korean "police action," and that it was again ready to meet any demands put upon it. However, he warned, the coal industry cannot exist on a stand-by basis and the best minds in the industry believe that a 500,000,000-ton productive capacity must be ready at all times, with men and machines, mines, preparation plants, railroad cars, and all the



Hugh B. Lee, president, Maumee Collieries Co., was Chairman of the Program Committee

things that it takes to produce that many units. Any capacity less than that, Campbell concluded, would be playing with fire in our national defense.

Hugh B. Lee presided as chairman for the rest of the opening session. He acknowledged Mr. Campbell's re-

marks and paid tribute to the work of the Program Committee in putting together the program for the 32nd Annual Coal Convention of the American Mining Congress.

First technical speaker of the Monday morning session, which had continuous mining as its theme, was Karl L. Konnerth, consulting engineer, Pittsburgh, Pa. Title of his paper was "Basic Requirements for Successful Continuous Mining." Konnerth pointed out that "continuous mining" should not refer to any particular mining machine, rather it should refer to continuity in use of the entire mining investment whether the various other auxiliary operations be in manpower, mining equipment, transportation equipment, or any of necessary to successful mining. He went on to say that in coal mining at present, the small portion of available time each piece of expensive equipment is in actual use would not be countenanced anywhere else in our national industrial economy. Continuous use of equipment is the goal.

"A complete Continuous Mining System" was the topic of the next paper, by F. Earle Snarr, vice-president, Freeman Coal Mining Corp. He described the method of full-seam pillar mining with continuous miners in the Illinois No. 6 seam at the Orient No. 3 mine. He said that the use of continuous mining must be credited to some degree for discarding of the long-standing philosophy that extraction of pillars in Southern Illinois by the retreat fracture-line method was impossible. In addition, the methods and machines now being used are doing the job with more success than was previously achieved by conventional methods and equipment.

Maintenance is important in any mining operation and William E. Hess, manager, Coal Mines, Vesta-Shannopin Coal Division, Jones & Laughlin Steel Corp., in his paper, "Maintenance of Continuous Mining Equipment," said that maintenance is one of the biggest problems confronting the operator of continuous



Part of the crowd that passed through the exhibition

mining machines today. He analyzed the factors affecting maintenance of continuous mining equipment and emphasized the importance of properly trained maintenance crews. Hess pointed out that although a maintenance program is highly desirable, it requires careful planning and execution.

E. H. Johnson, manager, mining sales, Kennametal, Inc., concluded the session with a discussion of the Hess paper. The mental attitude of the machine operator has a direct bearing on maintenance costs, he said. A man shouldn't baby the machine but, Johnson added, "you don't want him to get mad and tear up a set of bits in five minutes."

Manufacturers Division Meets

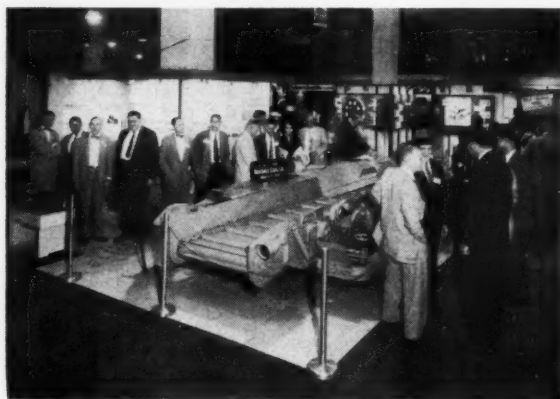
No sessions were planned for Monday afternoon so that full attention might be given to inspection of the impressive array of exhibits that 225 manufacturers of mining equipment brought to Cleveland.

At the Manufacturers' Division meeting that afternoon, Chairman J.

W. Overstreet, president, National Electric Coil Co., presided. Julian Conover, AMC executive vice-president, presented a complete account of the work of the organization for the past year, and reported the results of the San Francisco meeting last fall. He also outlined plans for the Las Vegas meeting, October 10-13, and for the Coal convention at Cincinnati next May.

Burdett Gibson of the Mining Machinery Branch, Business Defense Services Administration, Washington, described his agency's proposed statistical study of the manufacture of mining machinery and asked the cooperation of division members in compiling data.

Robert E. Lee Hall, general counsel, National Coal Association, explained the coal industry's position on pending natural gas legislation. He called on the manufacturers to join coal operators in supporting the Staggers and Kilgore natural gas regulation bills. These, he said, would strengthen America's fuel economy, contribute to the conservation of natural gas and



Mining men came from all over to look, inspect and learn

increase the overall defense power of the country.

Howard I. Young, president of the American Mining Congress and president of the American Zinc, Lead & Smelting Co., also addressed the group. He spoke of the fine cooperation shown by the various segments of the mining industry in making their common problems known to the Government.

Members elected or reelected to the Division's Board of Governors are: Edward McNally, McNally-Pittsburg Mfg. Corp.; John P. Courtright, Marion Power Shovel Co.; Jack How, Western Machinery Co.; Richard D. Ketner, General Electric Co.; Chester G. Sensenich, Irwin Foundry & Mine Car Co.; V. L. Snow, Euclid Division, General Motors Corp.; Charles Vignos, American Mine Door Co.; and W. L. Wearly, Joy Mfg. Co. Officers elected for the calendar year 1956 were: Chairman, Guy V. Woody, Allis-Chalmers Mfg. Co.; First Vice-Chairman, J. E. M. Wilson, Jeffrey Mfg. Co.; Second Vice-Chairman, Jack H. How, Western Machinery Co.; and Third Vice-Chairman, W. L. Wearly, Joy Mfg. Co.

Roof Support

On Tuesday morning Charles B. Baton, vice-president, Joanne Coal Co., presided over the Roof Support session. The first paper of the morning was given by E. M. Thomas, mining engineer, Roof Control Section, U. S. Bureau of Mines, who described the "Latest Developments of Mine Roof Bolting." Thomas began his remarks by stating that roof bolting has had considerable influence on coal-



Some equipment was unveiled to the public for the first time at the Show

mining methods although the radical changes predicted by a few optimists have not wholly materialized. He then analyzed the practical application of the slotted type bolt and the expansion-shell bolt and described recent research work carried on by the U. S. Bureau of Mines. He concluded by saying, "To those who are truly interested in the current drive in coal mines to reduce roof-fall accidents, it has been proved over the years that only systematic support, whether by bolts or by timbers, affords lasting safety."

Methods and results with mine roof bolting at the No. 2 mine of the Boone County Coal Corp. was the subject of the next paper, given by E. H. Green-

wald, general manager, and Vance Price, production engineer, Boone County Coal Corp.

The history of roof bolting at the company's property was described, including experiments with plywood shin plasters and wooden roof bolts. Extensive tests with wooden roof bolts by the company have led them to conclude that satisfactory wooden roof bolt assemblies can be designed. At the present, the comparative cost of such a bolt, coupled with the added labor of drilling a special hole and centering the bolt, does not warrant their use. Greenwald concluded by saying that further reduction in the cost of roof bolting would occur at the No. 2 mine principally in the field



As always, the large machines in Lower Lakeside Hall received close attention

of roof support material and that effective roof bolting at the Boone County Coal Corp. has meant efficient control of every poor roof, allowing the application of the latest mining equipment and methods.

W. J. Lewis, chief engineer, Ohio Brass Co., in discussing Greenwald's paper, gave the viewpoint of the manufacturer. He outlined the importance of hole size in conjunction with roof bolting and outlined common problems met at the face and how they can be solved.

W. F. Diamond, chief engineer, Island Creek Coal Co., presented a paper on full and partial extraction of mining systems at the Island Creek Coal Co. and associated companies. The entire text of this fine article appears on page 41 of this issue of the JOURNAL.

Auger drilling to control mountain bumps was the subject of the final paper of the roof support session. Woods G. Talman, general superintendent, Coal Division, U. S. Steel Corp., presented the paper. He described experiments which led to the present three-point system used in the Gary-Lynch District to control bumping. These are: (1) Setting off bumps by triggering them with 6-in. augers—mainly point areas known to be loaded; (2) probing doubtful blocks with 6-in. augers to see if the pillar can be mined safely; and (3) gradually unloading large blocks, known to be loaded, by using 24-in. augers, followed by normal development of the blocks.

Results of the program have been encouraging in that miners feel better about the job, which in the long run helps performance, and much valuable Pocahontas coal that otherwise would have been lost can now be mined.

C. T. Holland, head, Department of Mining Engineering, Virginia Polytechnic Institute, discussed the paper on controlling bumps. He discussed the use of auger drilling to control bumps in beds other than the Pocahontas coal seam. It was pointed out that the Pocahontas No. 4 coal is quite soft and has the ability to store a relatively small amount of energy. Other, stronger coals can store more energy and those are liable to bump more violently. The advantage of being able to predict which pillars might bump was also outlined. Holland seconded Talman's caution to use extreme care in planning and carrying on experiments with augering to control bumps.

Mechanical Mining

Concurrently with the Roof Support session, a Mechanical Mining session was held under the chairmanship of Birch Brooks, vice-president, Viking Coal Corp. R. J. Bowen, mine engineer, Coal Mines and Quarries, Columbia-Geneva Steel Division, U. S. Steel Corp., spoke on "Mechanical Min-

ing in Thick Seams." Bowen described the method of mining used at the Columbia and Geneva mines in Carbon and Emery Counties, Utah. The coal here averages 14 ft thick, with local variations from 8 to 16 ft and pitches to the East from 11 to 20 percent. Conventional room and pillar mining is practiced as is off-track mining with conventional equipment. The steep grades encountered require braking facilities not generally needed in the eastern coal districts of the United States. Reliable dynamic and mechanical brakes are essential on shuttle cars. Loaders and cutters must have convenient and quick acting mechanical emergency brakes, capable of stopping and holding the machine at grades up to 20 percent. In addition to adequate braking, the machines must have the power to tram up or down pitches at reasonable speed. The coal, which is used for coking, is not washed. The only cleaning done is some hand picking within the mine and

Garfield A. Schnee, general superintendent, Philadelphia & Reading Coal & Iron Co., described mechanical mining and long hole drilling in pitching seams. His paper dealt with advances in mechanized mining in the heavily pitching seams of the Anthracite field. Schnee traced the development of mechanical mining in Anthracite and outlined progress in long hole drilling at several collieries.

Maintenance was highlighted by Ralph W. Hatch, statistician, Hanna Coal Co., Division of Pittsburgh Consolidation Coal Co. "Machine Cost Accounting" was the title of Hatch's paper. He pointed out that as competition becomes keener, operation executives will require more cost records than ever before. High cost maintenance items must be pinpointed and corrective measures taken. Hanna has mechanized their offices with the installation of International Business Machines for three reasons: (1) to cut clerical cost; (2) to obtain more detailed information on all phases of



Roof support received proper attention at a Tuesday morning session

at the tripple. However, as the mines extend, more rock bands are being encountered and washing will probably become necessary at some future time.

Mechanical mining in thin seams was the topic of a paper presented by A. H. Mandt, vice-president, Stephens Elkhorn Fuel Corp. He described a completely mechanized operation in a coal seam which averages 34 in. Loading machines equipped with conversion booms put the coal on the bridge conveyors which in turn transfer coal to chain conveyors for delivery to mine cars. Operating double shift, five days per week, production through February 1955, was 1111 tons per day or 9.415 tons per payroll man.

His paper was discussed by J. D. Sutton, Clearfield Bituminous Coal Corp., who gave a brief resume of the many years' experience of his company with conveyors.

their operations at a lower cost; and (3) to level out peak work loads. Hanna's supply accounting has been on IBM machines since 1952, but in this short time they have reduced their inventory of supplies on orders more than 50 percent. In addition, the information they have been able to furnish to warehouse supervisors and the purchasing department have enabled them to do a much better job in warehousing and purchasing. As a by-product of this system, they have also been able to keep good maintenance cost records. The system is set up so that labor and supply costs are kept in detail on each piece of equipment.

Strip Mining

E. C. Weichel, vice-president, Hudson Coal Co., served as chairman of the Strip Mining session on Tuesday afternoon. William W. Dukes, mining

superintendent, Stonefort Corp., described a two-seam stripping operation using overland belt haulage to convey coal from pit to cleaning plant. Stonefort Corp. is now mining economically two 3-ft seams of coal separated by a parting from 6 to 17 ft thick. Because of this parting, the seam of coal had previously been considered uneconomical to strip. First a special shovel was designed. By lengthening the boom of a standard shovel from 113 ft to 133 ft and lowering it to a 40° angle, it became possible to strip both coal seams simultaneously without rehandling any overburden. The use of a belt conveyor to haul coal from the pits to the surface car indicated a substantial saving in haulage cost. Smaller, more maneuverable trucks are used than would be needed if all truck haulage was used. Experience has so far borne out earlier estimates in the economy of operation and the management feels that a forward step has been made in strip mining production of coal.

Gene Long, assistant mine superintendent, Truax-Traer Coal Co., described the new Truax-Traer wheel excavator. The excavator, used to strip the top 25 to 75 ft of overburden at the company's Fiatt, Ill., mine, was put into operation last November 15. It has successfully replaced two 10 cu yd draglines. Although not the first of its type in operation, it is the first that has been designed from the ground up exclusively for coal stripping service. It can dig a shelf more than 50 ft wide and stack the material 350 ft away. Long pointed out that the use of the wheel excavator allows the uniform application of relatively small forces which results in a steady power consumption, eliminating high and expensive peak loading. It also results in even loading of the machine's structure and its various units, thus reducing the damaging effects of shock loads. He pointed out that this should produce long life with low maintenance.

Taking part in a panel discussion on "What Improvements or New Design Features Are Needed to Raise the Efficiency of Strip Mine Haulage" were: Howard A. Raivio, special representative, Sales Division, Caterpillar Tractor Co.; Ralph H. Kress, executive vice-president, Dart Truck Co.; A. S. McClimon, manager, Sales Development, Euclid Division, General Motors Corp.; and Hoyt W. Smith, chief engineer, Equipment Section, LeTourneau-Westinghouse Co. The consensus of this group was that an important factor in strip mine haulage is the matching of haulage and loading equipment to provide the most efficient combination. It was also brought out that haul roads are often the determining factor in truck performance and that it is important to design the coal dumps so that haul-

age units are not delayed there. Panel members also agreed that each individual strip mine presented its own particular problems and that what might be the answer in one mine would not necessarily be the correct solution at another.

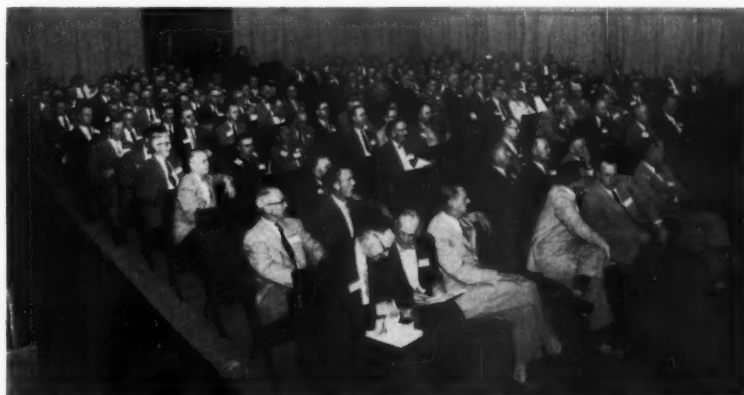
Raivio pointed out that equipment used by the coal strip mine industry has shown a steady increase in size and horsepower since the early days of mechanization. In designing coal haulage units of the future, greater consideration will be given to horsepower, to weight rate, capacity, power, maneuverability, maintenance, ease of operation and other factors to secure better over-all machine performance.

In speaking of time lost at grade crossings on mine haulage roads, Kress pointed out that time studies and experience have shown that in many cases overhead bridges have paid for themselves in reduced travel time, in one to two years. Kress also referred to the savings possible with torque converter equipped trucks.

process of engineering longer life into all component parts and face the pyramiding problems involved with even higher speeds. In concluding, he said that although many users are getting almost the last ounce of service from their equipment, others are failing to realize the capability built into their trucks.

Maintenance and Cost Control

With James Hyslop, president, Hanna Coal Co., Division of Pittsburgh Consolidation Coal Co. as chairman, one session on Wednesday morning was devoted to Foremanship, Maintenance and Cost Control. E. B. Leisenring, Jr., assistant to the president, Stonega Coke & Coal Co., in comparing coal mining in 1935 with 1955, said that today a section foreman produces the same amount of coal with one-third as many men and with two-and-a-half times the dollar value of equipment. The section foreman 20 years ago was expected to make one



Strip mining subjects held the interest of this group in the Ballroom Wednesday afternoon

McClimon emphasized the need for improved preventive maintenance practices and accurate record keeping so management can know the facts on actual haulage costs. He said that his company had studied many theoretical tractor trailer combinations up to 760 hp with 8 driving wheels and 125-ton payloads. These theoretical studies indicated that, given suitable haul roads, loading conditions and space to work in, haulage costs decrease as truck size increases progressively from 25 to 55 tons; then costs begin to rise again when 70, 100 or 125-ton trucks are considered.

Mine operators might consider larger capacity trucks operating at slower speeds to offset climbing haulage costs, according to Smith. He said speeds beyond those now available do not seem economically reasonable, and somewhat lower hauling speeds could have some desirable end results. He believes that in the final analysis payloads must get bigger, otherwise we must sweat out the slow

or two rounds of each section as an overseer. Today he must be in constant supervision of his section. The importance of the section foreman has grown tremendously and the Stonega Coke & Coal Co., recognizing the increased importance of good supervision, has developed an evaluation system for him. Four major uses for the information gathered by their surveys are: (1) to bring out any unfavorable personality situation which may be otherwise unnoticed or underestimated; (2) to discover obstacles confronting the individual foreman that can be overcome by help and advice or further training; (3) to bring to higher management's notice men of above-average potential who might otherwise be overlooked; and (4) to make mine management, section foremen and their superiors alike, aware of the increased importance of the qualities of good foremanship.

"Machine Breakdowns Can Be Prevented" was the thought-provoking title of the paper prepared by Hugh

H. Fraser, managing director and H. E. Hastings, director. H. H. Fraser & Associates, Ltd. Hastings, who presented the paper, emphasized that a great deal remains to be done in the field of equipment maintenance. He said that if the amount of down time does not seem too great to the mine manager, he is apt to believe that he has a good maintenance staff and lets it go at that. Without providing the means of measuring the work of maintenance it is unreasonable of management to expect a skillful job of supervision from maintenance foremen. To expect the average foreman to expertly juggle his job, men and machines in perfect harmony with no assistance except his native genius is unrealistic, Hastings went on. He then outlined ways and means for management to better control the maintenance factor.

In his discussion of this paper, Gordon MacVean, president, National Mine Service Co., said that too little effort and thought have been given to maintenance problems in proportion to all the man-hours of thought and effort that have gone into reducing coal production costs at the face. Too few coal companies, either large or small, he observed, have records that approach needed accuracy. He concluded by saying that any system which points up the difference between good and bad maintenance practices is certainly worthy of much thought.

Theodore M. Barry, industrial engineer, Barry and Co., management engineers, concluded the morning's program with a paper titled "Industrial Engineering Applied to Coal Mining." Barry said that there are two ways to improve productivity. One is to get better equipment. The other is to improve work productivity. In the latter field the application of industrial engineering becomes important with its time and motion studies, job analysis and work measurement, Barry said. He cited examples where the application of a thoughtful industrial engineering program had increased production tremendously and concluded by suggesting that the coal industry will face basically different problems in the next 30 years than in the past, and that the answers to the new problems will not come quickly but only through concerted effort by the industry.

Haulage and Power

C. O. Kane, manager, Coal Mines, Armco Steel Corp., presided as chairman of the Haulage and Power session on Wednesday morning. Stephen Krickovic, chief engineer, Eastern Gas & Fuel Associates, summarized needed considerations in the design of a main line haulage system as:

(1) The general projection of the mine to determine the location and extent of the main line.

(2) Type and number of mine cars

to be used, with emphasis on factors affecting their operation and maintenance.

(3) Type, size, number and general specifications of main line locomotives to be used.

(4) Advisability of using intermediate haulage.

(5) Specifications of a high speed haulway with respect to clearance, roadbeds and grade, track and trolley, controls, and power.

(6) The advisability of using single or double track haulage.

He said that the design of a suitable economic main line haulage system must include a thorough engineering analysis of all factors involved. Each mine will require special treatment and there is no standard formula applicable to all coal mining operations. To undertake the job in any other manner would be inviting the possibility of inefficient operation.

W. L. Husk, chief engineer, West Kentucky Coal Co., had as the subject of his paper "Shuttle Car Haulage with Conventional Mining." He described the advantages and disadvantages of all rail haulage with shuttle car gathering and all belt haulage with shuttle car gathering and concluded by stating that the combination of main line rail haulage and panel belts with conventional mining has most of the advantages of both with few of the disadvantages of either.

In presenting his paper "Mechanical Loading on Bridge Conveyors," Myron Kok, general manager, Warner Collieries Co., emphasized the part industrial engineering techniques played in opening up a mine which had a production record of better than 18 tons per man on the payroll during February and March this year. Detailed time studies of all mining operations in other properties of the company were used to predetermine the working force at the Bufflick mine of the company which opened in July 1954. Time studies were used to set up man-machine charts which in turn were used to establish crew size and a work schedule for the men. In January 1955, Piggyback conveyors were placed in a limited area of room work, and performance has ranged from 31 to 95 tons per man with an average of 40.42 tons per face-man. In the opinion of the company, Kok said, the true productive potential of bridge conveyor operation in seams from 4 to 6 ft high has never been obtained. The use of standard data, practical application of machine charts, delay control, a sound analysis of cycle balance, methods and change and a wage incentive will produce results up to a 100 tons per face-man with mechanical loading onto bridge conveyors.

Mechanical loading directly in the mine cars was the subject of a paper by Joseph Johnson, superintendent,

and John B. Harvey, chief engineer, Perry Coal Co. Harvey presented the paper. He described the haulage system of the St. Ellen mine which produces 5000 tons of washed coal per double-shift day. The mine is completely mechanized and all equipment is track-mounted. Each of the loading machines is served by two battery locomotives which shuttle one drop bottom car under the loading machine boom at a time. The average car change for the entire mines is 109 cars for each loading machine in a seven-hour shift, or 3 minutes, 52 seconds, loading time per eight-ton capacity car. One relay motor serves each loading unit. The main line haulage is handled by two 20-ton locomotives which pull 30 to 35-car trips to the bottom.

Final paper of the haulage and power session was given by W. R. Morton, application engineer—mining, General Electric Co. The title of his paper was "Use of A-C and D-C for Underground Power." Morton compared the use of a-c and d-c power systems for deep mines and concluded that while more thought must be given to maintaining low reactance and low voltage drop in a-c systems, there are many points in their favor such as:

1. The price of a-c motors is about two-fifths that of d-c motors.

2. 220-v a-c control is just about equal in cost to d-c control, while 440-v a-c control costs less than d-c control.

3. Portable a-c substations cost less than 30 percent as much as d-c conversion units.

4. Maintenance of a-c equipment is simpler.

5. The a-c system has greater versatility.

A second Strip Mining session was held Wednesday afternoon under the chairmanship of W. E. Mullins, vice-president, Midland Electric Coal Corp. J. Robert Bazley, president, J. Robert Bazley, Inc., presented the first paper of the afternoon titled "Latest Anthracite Strip Drilling Practices." In the first part of his paper, Bazley outlined recent advances including practices in the anthracite regions and stated that rotary type drills are rapidly replacing old type churn drills. He discussed and evaluated the various type of rotary and percussion drills now being manufactured and concluded by discussing the drilling action of a rotary bit and the effect of bit diameter on drilling costs.

Forbes R. Clarke, field superintendent, United Electric Coal Cos., followed with a discussion of new drilling developments in bituminous strip mining. He pointed out that the big reason for the switch to vertical rotary drills was economic. In one of the United Electric Coal Cos. mines, one rotary drill has replaced the seven churn drills previously used. After

discussing the various types of rotary blast hole drills now being manufactured, Clarke concluded by saying, "since so much success has been achieved with the air blast rotary drilling in the past few years, it seems very possible that we will find these rotary drills we talk of today develop into machines which will punch down holes at a fraction of today's costs in a few years."

Next on the session's program was a symposium which had as its subject "Auger Mining Correlated with Strip and Deep Mining." Fred O. See, vice-president, Cardox Corp., spoke first, using as his subject, "Recovering Fringe Coal by Auger Mining." He stated factors governing the selection of augering equipment and used case histories of mining operations to show results of augering fringe coal at properties where the average pit width is 22 ft.

J. M. Poindexter, sales representative, Salem Tool Co., described two augering operations indicating cost

and with the use of different type cutter heads, the size consist of the coal can be regulated.

The Akremite blasting process for strip mining was the subject of the last paper on the day's program. It was given by James A. Miner, president, Colonial Coal Mining Co., Inc. Miner described a new blasting method developed at Maumee Collieries Co. The overburden blasting medium is mixed at the mine site by company personnel using a commercial grade of ammonia nitrate and carbon black as primary raw materials. Miner described an operation using the Akremite blasting method and reported an 18-cent per ton reduction in drilling and shooting costs through the use of the new blasting process.

Continuous Mining

D. L. McElroy, vice-president, Pittsburgh Consolidation Coal Co., was chairman of the second continuous mining session, held Thursday morning. Richard T. Todhunter, Jr., gen-



Guy V. Woody, general representative, sales, General Machinery Division, Allis-Chalmers Mfg. Co., was elected Chairman of the Manufacturers Division for the calendar year 1956



Land and Water Use Committees met at lunch on Wednesday

eral manager, Barnes & Tucker Co., presented the first paper, titled "Continuous Mining in 42-in. Coal." Todhunter described operations at the Barnes & Tucker Lancashire No. 15 mine. There are now three Jeffrey Colmols and three Joy Continuous Miners in operation. About 25 percent of the present tonnage is still mined by conventional Joy loaders from places where conditions are not adaptable to continuous operation. Full retreat mining is practiced with all three types of machines being used on pillar recovery work. Todhunter said that much work has been devoted to the perfection of a continuous haulage system at the Lancashire mine. Although not yet perfected, he felt that continuous haulage is in sight through the use of traveling belt conveyors.

The third symposium speaker was Quentin G. Bullock, vice-president, Compton, Inc. He discussed practices which determine the proper size machine to be used on an augering job. Bullock went on to say that in addition to mining coal from high walls left by previous strip mining, there is a definite application for the coal auger in what is known as bench augering. Here, coal left between an earlier deep mine and the outcrop may be economically recovered by preparing a bench along the outcrop from which to mine the coal with an auger.

The consensus of the symposium was that augering has come of age and is certainly to be considered an integral part of a mining operation. It is a most economical and at times the only method of recovering fringe coal. In addition it permits selective mining

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"Pillar Extraction with Continuous Mining Machines" was the title of the next paper, given by H. A. Quenon, division manager, Eastern Gas & Fuel Associates. He described his

experience with continuous mining in the Pocahontas No. 3 mine using a Lee-Norse continuous miner. From January 1, 1955, to April 1, 1955, the machine operated 121 shifts out of a scheduled 128. With an average crew of eight men per shift, the machine produced an average of 273 tons of raw material per shift, or 34 tons per man-shift. Quenon said the major obstacle to increase production is the time consumed to install adequate roof support.

M. A. Williams, general superintendent, Oglebay, Norton & Co., presented a paper on continuous mining with extensible conveyors. Williams reported that his company's experience to date indicate that it is able to produce more coal per shift with the extensible conveyor than with shuttle cars, for service haulage, as well as to save one man per shift. The use of the conveyor also allows them to double the former room length. He reported that a crew can extend the belt in approximately five minutes, allowing a 50-ft advance per each extension, and moves the conveyor from one room to another in approximately two hours.

William C. Campbell, assistant to vice-president, Old Ben Coal Corp., followed with a paper on continuous mining with portable surge cars. He described the operation of a portable surge car behind a Goodman full face boring type continuous miner at Mine No. 9 of the Old Ben Coal Corp. Campbell concluded by saying it is entirely possible that a surge car of the proper design could, for all practical purposes, eliminate down time now caused by inadequate haulage facilities. However, he pointed out, in order to do so a surge car should have an unloading rate considerably higher than the continuous miners ability to mine and load coal.

Final paper on the program was

given by John A. Stachura, superintendent, Enoco Collieries, Inc., who spoke on "A-C Power in Continuous Mining." A thorough study of the application of a-c and d-c to continuous mining by his company, Stachura said, showed the following points: The initial cost of a-c equipment was considerably lower than d-c equipment; the cost of electrical equipment on an a-c powered Colmol was 9.8 percent less than on a d-c machine; the 300-kva transformer cost 69 percent less than a 300-kw rectifier unit; and the application of 440 a-c reduced cable cost more than 50 percent since a cable one-third the size and weight of that for d-c application was permitted.

His paper was discussed by B. E. Rector, mining section, Westinghouse Electric Corp. Rector amplified some of the details relative to a-c equipment and its operation.

Coal Preparation

Coal preparation was the subject of another session on Thursday morning. Its chairman was W. J. Skewes, chief engineer, Pocahontas Fuel Co.

The first paper on the session was "Fine Coal Preparation of Illinois No. 6 Coal," by Emery Milligan, preparation engineer, Freeman Coal Mining Corp. Milligan described the cleaning plant at the Crown Mine in Central Illinois. At this plant the plus 6-in. material is hand picked and the 6 by 1½-in. material is washed in a Jeffrey 8-cell, 3-compartment Baum type jig. The minus 1½-in. material is air cleaned on Super-Air Flow cleaning machines. Before cleaning the 1½-in. by 0 fraction is further broken down to 1½ by ¾-in., ¾ by ½-in. and ½-in. by 0. The minus ½-in. raw coal goes to a heat dryer for reduction in surface moisture before cleaning on the air tables. Moisture is reduced from a surface moisture of 4 to 6 percent to a discharge moisture of 1 to 2 percent.

J. D. Snyder, mining engineer, and J. E. Tobey, Jr., industrial sales engineer, Blue Diamond Coal Co., combined their talents to prepare the next paper which was entitled "Processing Fine Coal for Competitive Fuel Markets." Tobey presented the paper. He first traced the market influences which have affected coal preparation methods in recent years, and then went on to discuss the Leatherwood No. 2 cleaning plant of the Blue Diamond Coal Co. This plant employs two McNally-Tromp dense-media washers for cleaning the lump (14 by 2-in.) and small (2 by 1½-in.) sizes and Deister diagonal-deck concentrating tables for cleaning the fine (¾-in. by 0) coal.

F. P. Calhoun, assistant production manager, Rochester & Pittsburgh Coal Co., discussed the first two papers on the morning's program and pointed out that the two plants were

entirely different in design and use of fine coal processing equipment with both accomplishing the same purpose, namely, producing a marketable end product. He said that in all probability, neither of the processing plants described would be a completely satisfactory solution to the fine coal processing problem at another mine. Each property presents its own cleaning problem and demands its own engineering study. Calhoun concluded by saying the trend in processing plants is toward 100 percent cleaning and drying of all fine coal and that air cleaning will continue to be the practical solution to the fine coal processing in some instances.

"Cleaning and Drying Pittsburgh Fine Coal at the Mathies Mine," was the title of the next paper. It was given by David G. Werner, preparation plant foreman, Mathies Coal Co. In 1949 two Chance cones for cleaning 8 by ¾-in. raw material were put into operation at Mathies' preparation plant; the ¾-in. by 0 was dry-screened from the ROM and sent by belt conveyor to a power plant. Washed coal was of by-product quality. However, in 1952, it was decided to build a fine coal plant for cleaning the ¾-in. by 0. This was put into operation in 1953 and since that time ¾-in. by 0 has been processed and shipped for by-product purposes. The 8 by ¾-in. raw coal is still cleaned in Chance Cones but the ¾-in. by 0 raw coal is cleaned on Deister tables. After tabling, the fine coal is dewatered in CMI Centrifuges. The clean coal leaves the dryer with 7.0 to 8.0 total moisture.

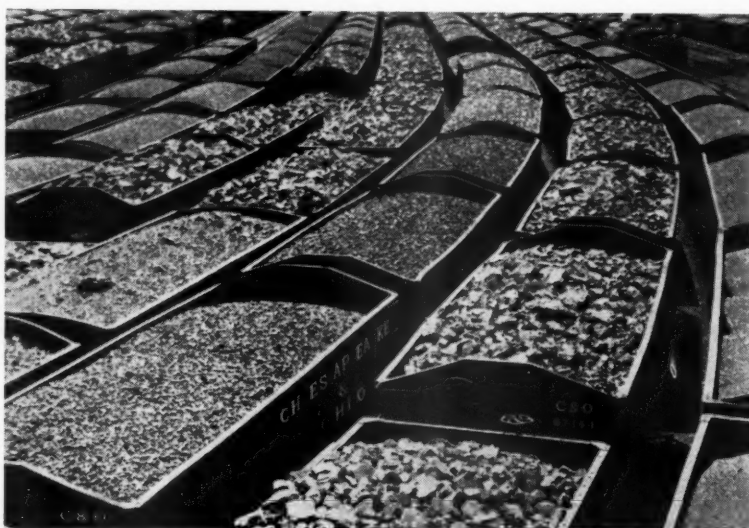
H. R. Middleton, sales manager, The Wilmot Engineering Co., wound up the morning program with a paper entitled "Anthracite Recovery from Silt Deposits at Jeddo-Highland."

The complete text of this paper has been reproduced on page 36 of this issue of MINING CONGRESS JOURNAL.

Safety Panel

On Thursday afternoon the technical sessions of the convention were climaxed with a Safety Panel under the chairmanship of Ralph E. Kirk, consulting engineer, Birmingham, Ala. The first panel member to speak was M. J. Ankeny, safety director, Bituminous Coal Operators Association, whose paper was entitled "Prevention of Coal Mine Explosions." Ankeny surveyed progress in combating coal mine explosions during recent years, giving a careful analysis of all contributing causes to recent miner ignitions that in themselves constitute a potential major hazard. He concluded his remarks by saying that the Federal Coal Mine Safety Act and the mining codes of the several States contain certain requirements intended to prevent coal mine explosions. These laws, in general, are adequate for the purpose for which they were intended, but like the problem of accidents on the highway, law enforcement is not now and cannot be the final answer. The ultimate solution must come from an awareness on the part of management and miner of the remaining hazards and a determination to do the things necessary to bring them under control.

"One Hundred Percent Accident Prevention Training" was the title of a paper by J. B. Benson, director of safety, Southern Coal Producers Association. Benson used several concrete examples to show the value of accident prevention training. He pointed out the essentials of a training program and emphasized the need for refresher courses or follow-up training to keep mine employees safety conscious.



Market demands on coal preparation techniques were thoroughly discussed in the Coal Preparation session Thursday morning

How a joint committee of coal operators, coal miners, and representatives of the Federal and State mines departments promoted coal mine safety in Indiana was the topic of a paper by Howard T. Batman, general manager, Lynch Coal Operators Association. The whole plan of the Indiana Joint Committee for coal mine safety can be summed up by saying that it is a joint effort between employees and management and the State and Federal mine inspection authorities to keep a definite safety program going all the time. The committee is in search of ideas which can be directed along channels of constructive thinking and education. That this program has worked can be proven by the fact that accidents in Indiana's coal mines during the past year have declined almost 50 percent, while the production of coal increased approximately 10 percent.

J. J. Forbes, director, U. S. Bureau of Mines, then reported on roof-fall hazards. He reminded his listeners that in 1954, 53 percent of all underground fatalities in American coal mines resulted from falls of roof, face and rib. In general, Forbes said, suitable roof-control standards have been established, but, as the records show, they are not rigidly followed. He concluded by saying it is important to consider each portion of newly exposed roof as dangerous and that every reasonable precaution should be instituted to support roof promptly by temporary means until permanent support can be installed.

Edward Steidle, chairman, Federal Coal Mine Safety Board of Review, followed with a report of the impact of recent Board decisions on the program for greater mine safety. Dean Steidle outlined the course of events which established the Federal Coal Mine Safety Board of Review and then went on to discuss four of the Board's foremost recent decisions in detail.

The general outline of the United Mine Workers' safety program was the subject of the next paper. It was presented by Charles B. Ferguson, director, Safety Division, United Mine Workers of America. Ferguson told how the Safety Division of UMW worked to reduce accidents and fatalities in coal mines. He concluded by saying that although accident records have been improving in recent years, this knowledge does not give us the right to feel smug about this accomplishment.

Thomas Allen, chief inspector of coal mines, State of Colorado, then addressed the final convention session on the topic of safety education. He wondered if we were not overtraining mine officials such as mine foremen, assistant mine foremen and fire bosses. He felt there was no need for them to know the answer to highly technical



The Coal Show Committee inspected the exhibit halls on Sunday to assure that all was in order for the Monday opening

and theoretical questions which quite properly fall into the province of the mine engineer. In the field of workers' education and training Allen said that, in addition to safety instruction classes, a continual contact should be kept with mine employees by leaflet and pamphlet distribution through the mail. This approach would have the added advantage of bringing the safety message into the home. He concluded by saying finally, every effort should be made to keep up first aid programs, accident prevention programs, safety meetings, vocational schools, and any other training or educational activity, because education and training are the most effective forces available to make the mines safer.

Have Fun Too

On Wednesday night the Coal Miners Party was held in two sections, at the Carter and Statler Hotels. A gala evening of dancing, dining and entertainment was enjoyed by the throng that attended. The food, the fun and the music were outstanding at both hotels.

Ladies attending the AMC coal show again enjoyed a number of spe-

cial parties in their honor. The Welcoming Luncheon on Monday noon was well attended. The highlight of this "Get Acquainted" party was a presentation by Bill Hixson, well-known flower designer, entitled "Fun with Flowers."

On Tuesday a luncheon and style show was held at the Hotel Cleveland. The latest fashions for all occasions were shown by the Higbee Co., leading department store in Cleveland.

The ladies went nautical on Thursday for their final party. Aboard the *Carol Diane*, a new diesel-powered vessel, they saw Cleveland from Lake Erie and traveled up the Cuyahoga River to view the great industrial valley with its docks, steel mills, ore refineries, and other interesting sites. Refreshments were served aboard.

Land and Water Use

The Land and Water Use Committees of the American Mining Congress and the National Coal Association held a luncheon meeting on Wednesday. A full agenda was disposed of as members of both organizations discussed the problems of land use and water and air pollution in connection with mining.



The ladies were remembered with a number of special parties in their honor



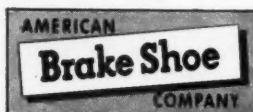
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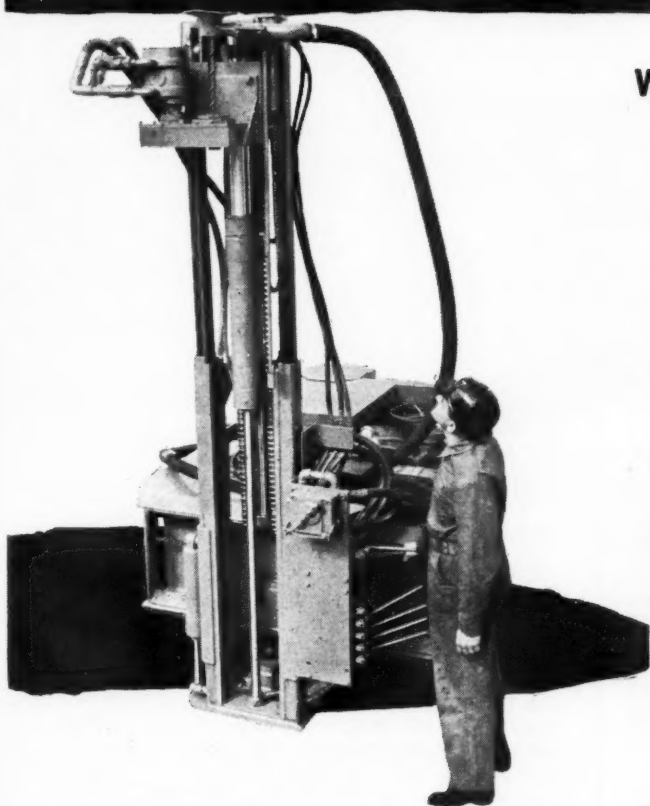
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6. Makes installation of bolted crossbars a simple and safe operation.
7. Protects operator—by acting as safety jack at point roof is being disturbed.

The new Fletcher floor-to-roof feed system is now available for operation in heights from 4 to 11 or more feet, with feeds from 54 to 102 inches. In use, the operator trams and positions his drill as with the standard machine. Then, with an additional hydraulic control, he raises the upper portion of the mast, complete with drill guide and dust collector, firmly against

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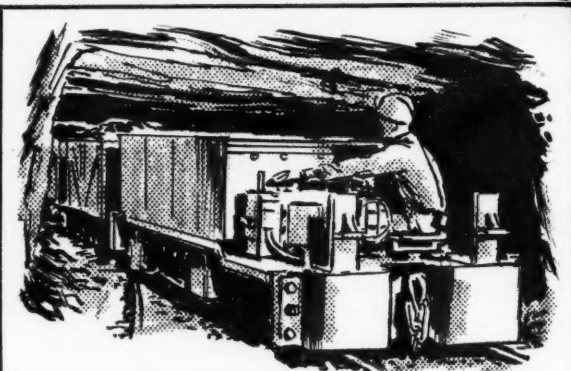
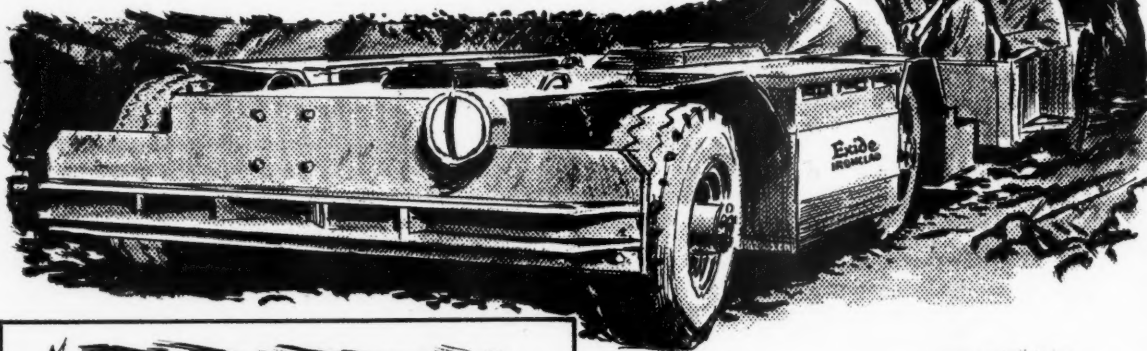
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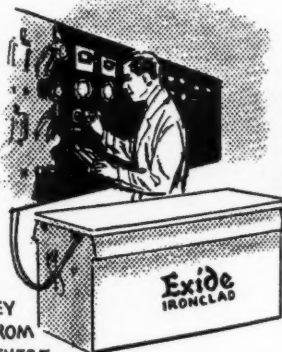
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Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.



New, but field tested!

This LS-98 *Excaloder*, with 1¼-yard rock bucket, owned by Black-White Limestone Co., Inc., loads out over 1000 yards of shot limestone per 9 hour shift. No downtime has been necessary in 11 months' underground mining operation.

Announcing the NEW EXCALODER

For low-clearance underground work—or general bulk materials handling

DESIGNED for use with the high-speed, heavy-duty Link-Belt Speeder LS-98, the *Excaloder* is a telescoping, interchangeable, front-end attachment for high-production loading. Job-tested for a year and a half, it has proved today's most advanced method for loading shot rock, sand, gravel or other loose materials into trucks or other haulers.

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EXCEPTIONALLY LOW OVERHEAD CLEARANCE—Standard mast requires only 15 ft., 10 in. clearance height . . . maximum dumping height with stick extended at 45°, is 16 ft., 11 in. Extra-low mast, optional, permits minimum clearance height of only 11 ft., 3 in.

FAST, POSITIVE, PRECISE CONTROL—*Excaloder* brings you the benefits of Speed-o-Matic—the true power hydraulic control system. These fingertip controls provide perfect "feel" for speed with accuracy . . . permit infinite positioning of the bucket at variable angles to the stick . . . reduce operator fatigue . . . boost output by up to 25% or more.

FULL-TIME HYDRAULIC BUCKET CONTROL—Through Speed-o-Matic, the *Excaloder* operator can control the speed of dumping. He can also either dump or return the bucket, regardless of the position of the attachment.

POWERFUL, INDEPENDENT CHAIN CROWD AND RETRACT—This chain crowd arrangement provides more positive crowding and retracting than is found in other types of crowd mechanisms. It also stands up longer, minimizes downtime.

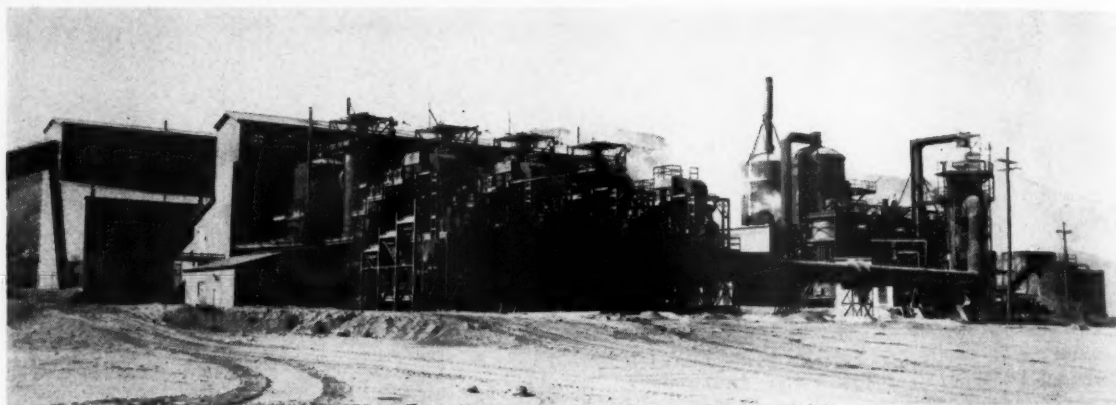
STRAIGHT-LINE BUCKET MOTION—This motion, during crowding or retracting, makes the *Excaloder* particularly valuable for grading and clean-up or loading from stock piles. For many cleaning and similar operations, the bucket can be tilted to the dump position and used for dozing.

13,822

INDEPENDENT SWING AND TRAVEL—This optional feature allows the *Excaloder* to work while it travels.

NEW EXCALODER CATALOG gives you more complete data and specifications. For your copy, contact your Link-Belt Speeder distributor or write—LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

LINK-BELT SPEEDER



FluoSolids and Acid plant at Weed Heights

FluoSolids Roasting of Sulphur Ore

Plant Operation and Its Problems in the Crushing and Roasting of Low Grade Sulphur Ore

By A. J. GOULD

Plant Superintendent
Yerington Mine, Anaconda Copper Mining Co.

IT IS PROPOSED here to cover the general operation of the FluoSolids plant briefly and to discuss specific operating problems to the extent that space allows.

Anaconda did not undertake the direct processing of low grade sulphur ore to sulphuric acid as a new approach for profit, but from necessity. When it was decided to go ahead with the development of the copper ore body at Weed Heights, the supply of sulphur in this country was under Government allocation. The government requested Anaconda to supply sulphur for leaching its copper ore from some other source, if possible. This led to the purchase and development of the low grade sulphur Leviathan Mine, Alpine County, Calif.

The Leviathan Mine is located 58 miles from Weed Heights at an elevation of 7000 ft. The ore is mined by open pit methods during a seven-month period each year, enough being stockpiled at the plant to operate during the winter months, when snow makes it too difficult to operate the mine.

Run-of-mine fines contain 12 to 18 percent sulphur in portions of the mine. This material is crushed and

screened at the mine, the minus $\frac{1}{8}$ in. fines being discarded. This screening operation raises the sulphur content to about 30 percent. Ore is crushed to minus five in.-size at the mine. This has been of great benefit in hauling, stockpiling and feeding to the plant.

Sulphur content of ore is 25 to 28 percent elemental sulphur and at times runs five to six percent pyrites. The sulphur impregnates extremely altered volcanic tuffs, agglomerates and andesites.

Solve Fire Problem

It was originally intended to stockpile in well separated 10,000-ton piles. The first ore placed in stockpile was predominately coarse in size and contained considerable pyrite. This stockpile caught fire twice from spontaneous combustion. When consulted, the U. S. Bureau of Mines in Denver noted that the problem was similar to those faced in coal storage. Accordingly they advised one large stockpile with careful attention to the distribution of fine and coarse material to prevent air chimneys. This has been a very satisfactory method. It permits unloading trucks to maneuver on the stockpile with a minimum of dressing by bulldozer, and the stockpile has not caught fire since this practice was adopted.



Sulphur ore is mined 58 miles away at Leviathan Mine in Alpine County, Calif.

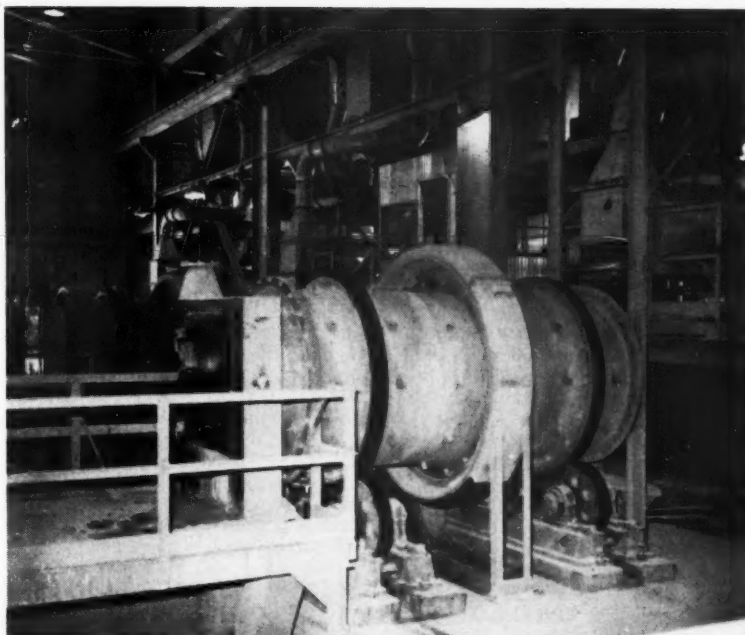
Crush in Three Stages

Crushing of ore at the plant for the reactor feed is accomplished in three stages. The first and second stages at the rate of 125 tph.

In the first stage, ore is reduced to three-in. size by an 18 by 36-in. jaw crusher. The dust from this crusher is drawn over a 15 tube multiclone by a 12,000 C.F.M. blower type fan. Dust fires have not been a problem.

In the second stage, ore is reduced to minus one-in. by a four-ft Nordberg shorthead fine bowl crusher. For some time the undersize material was screened and by-passed around the crusher. Screening has been discontinued for the present, and fines are passed through the crusher in order to utilize their smothering effect on fires. Dust fires are a considerable problem at this installation. When grinding ore of five to seven percent moisture content and sulphur content of 30 percent or over, the fine dust will flash fire frequently, at times repeating within a minute. In extreme cases flame has shot out along the discharge belt for 10 to 15 ft. By maintaining a strong air sweep around the crusher with a 5500 cfm blower type fan drawing over a 12-tube multiclone the dust fire flashes can be held so that they are a nuisance, but not a hazard. In spite of all this combustion the ore on the discharge belt has not been afire at any time.

Crushed ore is then conveyed to storage bins—a 300-ton steel bin supplying each of four reactor units. Storage at this stage was necessary as the material will not flow after the third stage of grinding, that is after passing through the rod mills. No difficulty has been experienced with flow of minus one-in. material from bins. Bins are dust sealed and dust from loading operation is drawn through the same system that protects the rod mills.



Crushed ore is fed to rod mills for grinding as required for burning

Handle Coarser Material

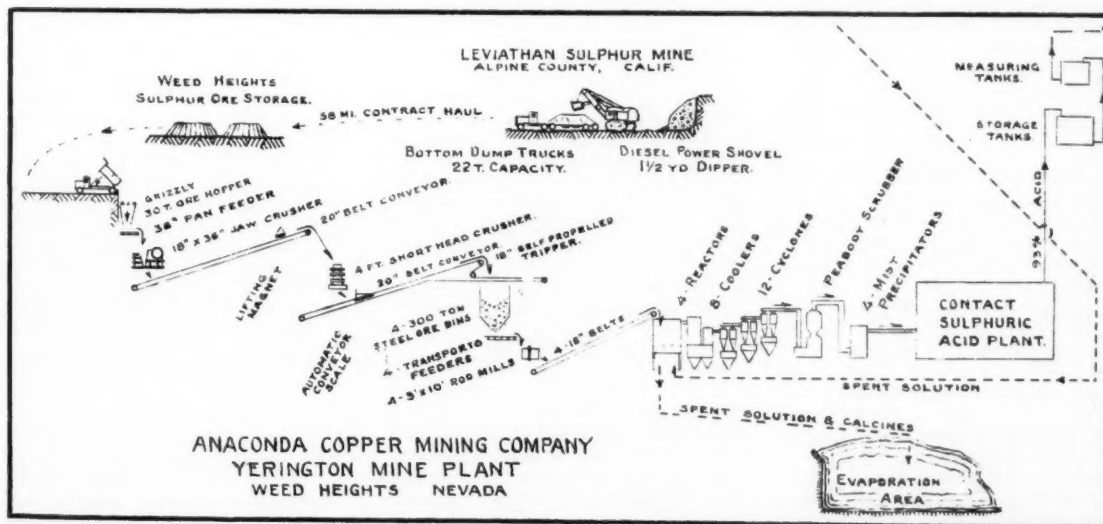
Ore is fed by variable speed transport feeders to dry grinding in five by ten-ft rod mills as required for burning. It was originally intended to crush ore to minus 10 mesh, but this has been permitted to coarsen to the extent that the open circuit will allow. Typical screen analysis at present will show

20% + 10 mesh
53% — 10 + 48 mesh
23% — 48 + 200 mesh
4% — 200 mesh

Each rod mill has dust suction at feed and discharge end, dust being drawn to a nine-tube multiclone and returned to the rod mill feed. It

would be better to return this dust to rod mill discharge but this installation was a late addition and placement on the discharge end was not practical.

Dry grinding in the rod mills yields a satisfactory product. If moisture content of ore is too high, that is 9 to 12 percent, the material has a tendency to stick to the mill sides causing rods to fall in a bundle and feed must be cut off while the mill grinds out. With an annual total precipitation of five to six-in. rainstorms acting on the stockpile are so infrequent that excess moisture is not a major problem. As an example of operating contrasts, the moisture content is so low at present (three



percent) that a small water spray is being used in each rod mill.

During cold weather dust collection on the rod mill discharge is not possible as the product leaves the mill hot and steaming. The steam promptly condenses in dust ducts and the system plugs with mud.

On the basis of less than a year's operation, it appears that 40,000 tons of product is all that can be expected from a set of rod mill liners. A consumption of approximately one lb of rods per ton can be estimated.

Sulphur ore is carried by an 18-in. conveyor belt to a point above and to one side of the top FluoSolids reactor. This was designed to permit a choice of feeding point into the reactor. At present ore is dropped through a drum type star feeder in the top of reactor on one side.

Plan Further Tests

Before proceeding with the actual roasting operation, another quick look at the ore crushing problem is in order.

We are pleased with the ability of the Dorr Co. FluoSolids reactor to process a coarser grind of material than originally anticipated. It is intended to place one reactor unit on a test basis in the immediate future to determine maximum size of feed. It may be 3/16 or 1/4 in.

Since one of the most difficult operating problems has been to place crushed material *inside* the reactor before burning it, the thought of briquetting the minus 1/2-in. material is very attractive. The fines briquette easily with six to 8 per cent moisture content and disintegrate while burning. This approach would confine the dust problem in the feed to one small area. It would permit final crushing before bin storage for burning. It would require a roll crusher and briquetting machine operating seven to eight hr a day in place of four rod mills, three of which operate 24 hrs per day. This approach would give a clean, coarse feed that could be placed in the reactor with comparative ease. However, no concrete plans to put this scheme in practice have been made.

Roasting Operations

Four FluoSolids reactor units are available for roasting of the ground sulphur ore. Normal operation requires three units in service and one stand-by.

A reactor unit is a cylindrical steel furnace standing vertically. It is lined with nine in. of insulating brick and 4 1/2 in. of fire brick. Inside dimensions are 18 ft diameter and 25 ft high.

The fluid bed is comprised of a five ft depth of either screened sand or calcines. The fluidizing air is distributed through hooded nozzles in a perforated base plate. Nozzles through

the plate from the wind box are spaced one ft apart. A positive pressure blower capable of 13,000 cfm at three psi serves each reactor. Blowers are equipped with intake filters and snubbers to reduce noise and pulsations.

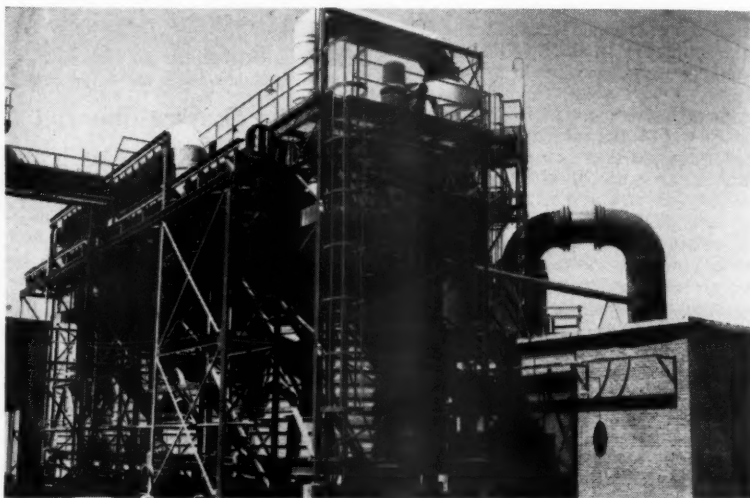
In starting, the reactor is preheated to 900° F. or over, by propane gas. The normal feed rate will be seven to nine tph depending on grade of material. The burning of this sulphur ore on the fluidized bed will maintain temperature in the reactor at 1100 to 1250° F. Volume of air required to fluidize the bed will vary with grade and feed rate. Normally 8000 cfm fluidizes the bed, and furnishes approximately 70 percent excess air over that required to convert 98 percent of the sulphur in the ore to SO₂ as 12 percent SO₂ gas, and the iron content (5.5 percent) to Fe₂O₃. Pressure in the reactor varies from 1 1/2 in. water as vacuum to two in. water as positive pressure.

A central control room contains in-

not fall straight down in a vertical chute without building up on the sidewalls if the moisture content is over 6 percent. An inlet was cut through the top of the reactor. When a drum type star feeder is placed at the top of the short inlet tube to prevent back flashing or burning, the ore can be dumped from the end of the conveyor belt, through the star feeder and directly into the reactor. Pouring fine materials into the top of the reactor undoubtedly adds to short circuiting and flash roasting, but continuous operation makes it very worthwhile.

- (2) Temperature control in the reactor is necessary. Quench water can be added to reactor bed in two places.

While quench water is added to the bed at five to 6 gpm under automatic control, the rate



After scrubbing, gas passes through four mist Cottrells to precipitate fine dust or smoke

struments and remote control mechanism to control the feed rate to the reactor, record temperature in each quadrant of the reactor bed, in the free board, and in the cooler following the reactor. It also contains pressure indicators from throughout the system and adjustment controls. This centralized control makes it possible for three men, one operator on the rod mill floor, one operator and a helper with the reactors to operate three reactor units through a shift.

Changes Made

It has been found practical for smooth operation to make several changes since the start of operation.

- (1) Feed was originally placed through the side of the reactor about one ft above the bed. This ground sulphur ore will

of flow tends to surge from nothing to 15 gpm. A spray through the top of the reactor is being tried and gives steadier results. In this connection, the reactors have been operated on ore containing 22 percent sulphur without difficulty in maintaining temperature, and on 39 percent sulphur ore without too much difficulty in cooling. These reactors have a remarkable ability to retain heat. Operating at 1200° F, they can be shut down and restarted late the third day at a temperature of 875° to 925° F. without preheating.

- (3) Calcines are normally withdrawn by overflowing from the top of the fluidized bed through a trapped tube. This necessitates close control on feed size.

We find that the depth of bed can be judged accurately by the pressure drop through the bed and calcines will flow just as smoothly from near bottom of bed. This has permitted coarser feed. When the plant first started, careful attention was given to obtaining feed of minus 10 mesh. Calcine discard from reactor equalled 20 to 26 percent of feed, the balance passing to dust precipitating equipment. Using a calcine withdrawal near the bottom and 20 to 25 percent of feed being plus 10 mesh, the calcine discard at the reactor equals 45 to 50 percent of the feed. This is an important relief to dust precipitation in the circuit. As stated earlier, this approach warrants further investigation.

- (4) It is possible under some conditions to place ore in the reactor with insufficient air for combustion. This will yield a mild explosion when air is supplied. It is also possible for gas valves to leak and form gas pockets. There is also the operators' bugaboo of power failures, and the necessity of quick release of accumulating gases. The gases from the reactor can be released to atmosphere through a sand-sealed plug damper, but it is slow and cumbersome. The cooling chamber following the reactor contained an explosion insert of bricks, but on three occasions we found this quite inadequate and the entire brick dome of the cooler had to be replaced. A short 30-in. diameter stack with a flap valve sealed with four in. of sand has been placed on each cooler. They have functioned very well as an automatic and quick relief valve.

Calcines from the reactor, and all dry dusts from cyclones are discharged to and quenched in a concrete launder, then sluiced to an evaporation area by discard solution from the leaching operations.

Sulphur dioxide gas containing approximately 50 percent calcines as a dust load leaves the reactor at 1200 to 1250° F. The gases pass through a brick lined cooling chamber containing 20 high pressure water sprays and is cooled to 950° F. From this point the equipment is unlined mild steel.

From the cooler, gases pass through three stages of cyclones, each stage consisting of four cyclones in parallel. These 12 cyclones per reactor unit remove approximately 92 percent of entrained solids.

Trouble With Dust Valves

Considerable difficulty with dust valves to handle material at 800 to

1200° F. has been experienced. A Dorr Co. Fluo-Seal consisting of pipe tube with right angle discharge and balanced with a small air injection does an excellent job for reactor discharge. A star type valve with water cooled bearings of our design, and built in company shops is doing very well under the cooling chamber, transfer chamber and the first bank of cyclones. Buell PMF flapper valves are serving well under the second and third stages of cyclones.

Normally the FluoSolids division ends at this point, however, one severe problem has been the dust carried by the gas stream beyond the cyclones. This is in no way a criticism of the cyclones—they do an excellent job on dust of plus 10 micron size.

The feed to the reactor will carry approximately 4 percent of minus 200 mesh material. Due to disintegration during roast, 21 to 23 percent of the calcines will be minus 200 mesh.

To break down further:

15 to 17 percent of calcines will be

minus 325 mesh.

8 to 10 percent of calcines will be minus 20 microns.

3 to 4 percent of calcines will be minus 10 micron, and some of this is minus 2 micron, or in other words—smoke.

The dust load of very fine material is greater than anticipated. The three plate scrubber following the cyclones uses 650 gpm of fresh water and does an excellent job.

After scrubbing, the gas passes through four mist cottrells in parallel and the ability of these cottrells to precipitate this fine dust or smoke with the acid mist is of great importance. Approximately 16 lb of solids per day are passing the cottrells but this can be tolerated.

From the cottrells the gas passes to a standard Chemical Construction Corps. contact acid plant with a rated capacity of 450 tons of 100 percent H_2SO_4 per day. The contact acid plant is very flexible and can be oper-

ated at 200 to 450 tpd with excellent temperature control.

And in Conclusion

The plant is new. There have been, and still are, problems. Handling of dust in both feed and calcines will be improved.

It is a good operation and is definitely one method for economic use of the great tonnages of low grade sulphur ores in the United States.

There has been a wealth of effort and good thought go into this installation by many men, to mention a few:

Clyde Weed, vice-president in charge of Anaconda Operations;

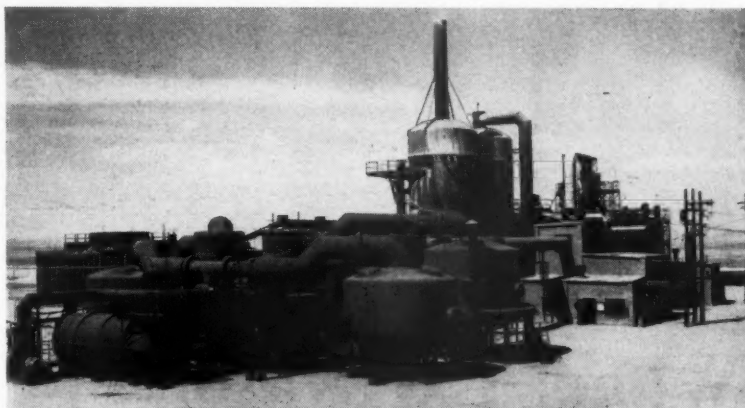
Frederick Laist, vice-president in charge of Metallurgical Operations;

The Engineering Department of Anaconda Copper Mining Co.;

F. F. Frick, chief research engineer, and in the local organization:

A. E. Miller, general manager, Yerington Mine;

Frank Monninger, general plant foreman;



Contact acid plant has rated capacity of 450 tpd of 100 percent H_2SO_4

John J. Hyland, master mechanic; Howard Jacky, foreman of FluoSolids and acid plant.

I would like to compliment our operating crews. They individually applied effort as if they owned the plant. This effort on the part of all concerned has made it both a privilege and a pleasure for me to be part of the accomplishment.

HOWDY PODNER!



LAS VEGAS—OCTOBER 10-13



With an appetite of 45 cu yd per minute, this 1250-ton giant is eating away the overburden above a valuable Illinois coal seam

Wheel Excavator Speeds Stripping at Truax-Traer *

New 1250-Ton Multi-Bucket Stripper Teamed with 30-Yd Shovel to Meet Deep Overburden Problem at Central Illinois Coal Mine

A NEW electric wheel excavator is now in full operation about three miles south of Fiatt, Ill., for Truax-Traer Coal Co. Made by Bucyrus-Erie Co., South Milwaukee, Wis., the "954WX" wheel excavator, as it is designated, began operation on November 15, 1954, culminating more than four years of planning, designing, and construction. It took 61 railroad cars to ship the

* Article and illustrations courtesy Bucyrus-Erie Co.

components plus three carloads of erecting equipment.

Designed specifically to assist in deep stripping, the new 2,500,000-lb machine (working weight) is currently operating in the south pit, the deepest of three pits in the Fiatt mine. The wheel excavator is teamed with a Bucyrus-Erie 950-B stripping shovel, equipped with 30-cu yd dipper. Working in tandem, the machines are systematically moving from 55- to 80-ft

of overburden to uncover a coal seam averaging about 4½ to 5 ft thick.

Removes Softer Overburden

The wheel excavator works ahead of the shovel and removes the upper strata of overburden, consisting mostly of loam, clay, sand, and some shale, leaving a layer of hardpan, shale and blasted rock for the shovel. The wheel cuts a 50-ft wide shelf on a highwall with a 2 to 1 slope in overburden too deep to be handled efficiently by the 950-B within its practical digging and spoiling range of approximately 250 ft. With the new excavator's dual conveyor system and maximum working range of 350 ft from cut to spoil piles, material can be spoiled advantageously on mined areas beyond the limits of the shovel

in a continuous arc that reduces the danger of slides.

Truax-Traer Coal Co.—now operating a total of 16 mines in West Virginia, Illinois and North Dakota—is well-schooled in the successful handling of deep overburden. The Fiatt mine was opened in 1935, and, until the wheel was brought in, the south pit was worked by the 950-B and first one, then two 10-cu yd draglines. One of these draglines was used with the shovel in the pit for stripping. When overburden depth increased the third machine was placed on the spoil for rehandling material to keep the pit open and to prevent slides from covering unworked coal seams. These units are now free to work in other pits.

The wheel excavator moves on four sets of crawlers like those of a large stripping shovel. Hydraulic jacks at the bases' four corners automatically keep the machine level. The piping arrangement for the jacks is designed so that quick action in equalizing the pressure in the four jacks can be accomplished when the machine is trumming. This design gives the machine greater stability and reduces uneven wear on many parts.

Limit switches permit tramming in only two positions of the machine—one when the conveyors are parallel with the direction of crawler travel, and the other with the conveyors at right angles to the direction of crawler travel. This assures maximum stability during traveling and keeps the loads on the lower works at a mini-



Overburden can be stocked as far as 350 ft from the cut

mum according to assistant mine superintendent Gene Long who described this wheel excavator to the industry at the American Mining Congress Coal Show in May.

Construction Details

The revolving frame is designed specifically for wheel excavator service. Its overall dimensions are approximately 48 ft long, 30 ft wide and 50 in. deep. Two swing units give the correct speed for digging and produce a maximum side digging force on the buckets of 30,000 lb.

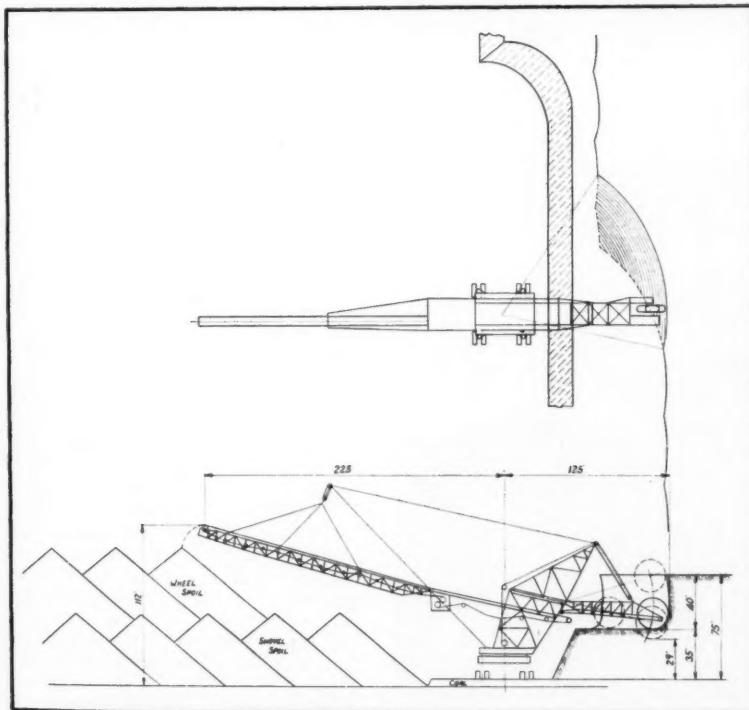
The digging wheel and its machinery are mounted on an all-welded structural steel digging ladder. At its inner end the ladder is equipped with trunnions on each of which are mounted a saddle block and rack pinion. The saddle blocks are supported on the lower beams of the crowd machinery frame, which also forms a part of the machine's superstructure.

On the upper beams of the crowd frame 35 ft of gear racks are mounted. The digging ladder can be extended or retracted a total distance of 35 ft along the crowd frame, which is inclined at a 12° slope. Maximum digging height with ladder retracted and elevated to 12° angle is 75 ft; minimum digging height with ladder lowered 12° is 29 ft.

Sixteen ft aft of the digging wheel, the digging ladder is supported by two 10-part tackle blocks suspended from the digging ladder gantry. These suspension points were so located as to relieve the rack gearing and the saddle blocks of as much load as possible. The widespread twin suspension resists the rolling or twisting forces imposed on the ladder by eccentric loads from the swinging forces acting on the wheel during digging. The upper blocks of the suspension tackles are mounted in the all-welded digging ladder gantry.

The live ends of the suspension tackles lead over sheaves in the superstructure to twin drums of the digging ladder hoist machinery unit mounted on the revolving frame. The twin drums are geared to be driven from one motor. In order to adjust the two suspension tackles to equal length and to keep the digging ladder in the correct plane, a disengaging coupling is provided. This permits each drum to be slipped, independently of the other, equalizing the cables.

The wheel drive unit is mounted on deep, heavy girders designed to prevent excessive and damaging deflec-



This schematic drawing shows the operating range of the machine

tions to shafts, gears and bearings. Anti-friction roller bearings are used throughout this unit. The wheel itself is mounted on a non-rotating shaft, the diameter of which is 16 in. inside the bearings.

To absorb digging shock loads, a rubber cushioned clutch is installed on the wheel. An air cushioned coupling in the drive machinery prevents damage from severe overloads. The machinery is powered to deliver a maximum digging force at the bucket lip of 47,000 lb., compared with a digging force on the 950-B of 200,000 lb.

Big Motors Used

Except for one a-c motor which drives the crowd machinery, all of the major units of the machine are driven by General Electric d-c mill type mo-

tors which are Ward Leonard controlled. The same size motor is used on the wheel drive, digging ladder, hoist machinery, and digging ladder conveyor drive. Each has one 187½-hp motor. The stacker conveyor drive is powered by two motors of this size. Power is furnished to these units by two General Electric 800-hp synchronous-motor-driven generator sets, mounted at each end of the revolving frame for better weight distribution.

Two conveyors make use of 700 ft of 54-in. wide by one-in. thick heavy duty belt. The system is designed to handle a continuous stream of material. Speed and capacity of these belts determine what "size" wheel excavator you have. Maximum capacity, at 100 percent efficiency, would be reached at maximum speed under a fully loaded belt. Although

the Bucyrus-Erie wheel excavator reached an operating rate of 79 percent during the period of adjustment and experimentation, complete performance data are not yet ready for release.

Wheel Capacity

The digging wheel is equipped with nine chain-backed buckets, and it measures 22½ ft in diameter over the bucket lips. Heavy backing chains assure quick dirt fall-out when the buckets reach the discharge position. Each bucket holds approximately ¾ cu yd for a wheel capacity of 7½ cu yd. The wheel rotates at 5¼ rpm or about 52 buckets per minute.

The buckets discharge the material on an inclined slope sheet which in turn delivers it to the 70-ft long digging ladder conveyor. Each of the nine buckets is equipped with four teeth spaced on the lip to produce the proper slicing of the material being dug. Both the buckets and the teeth can easily be removed from the wheel and replaced with spares when repairs are required.

During extremely wet or cold weather, a compressed air fed kerosene-burning torch—mounted on the digging ladder along with a 591-gal supply tank and an air compressor—is used to heat the buckets. The flame is directed at the buckets from a distance of six ft. General Electric Calrod heaters at the heel of each bucket provide additional heat to minimize sticking.

Conveyors

The discharge onto the first belt requires a specially designed conveyor. In the loading zone, conveyor rollers are 12-in. diam shock absorbing rubber discs mounted on a four-in. diam steel tube. Outside the loading zone, steel rollers without rubber are used. These rollers are seven inches in diameter.

Conveyor design is also unique in that only the inclined concentrating side rollers are in line. The center rollers are staggered between the side rollers. This spacing distributes the load more evenly between the rollers and also affords more uniform support for the conveyor belt.

Material on the digging ladder conveyor discharges to a 285-ft. long stacker conveyor. The latter spills out over spoil piles 225 ft from the machine's centerline of rotation or about 350 ft from the cut.

The first 110 ft of this conveyor are supported in the superstructure of the machine and the outer 175 ft are mounted on a structural stacker ladder. The ladder is pin connected to the superstructure at its inner end and may be raised or lowered by a suspension tackle. The stacker is normally carried at maximum incline of 15°. The upper block of this suspen-



A wide, level shelf is left by the excavator



The business end. Note the man on the digging ladder and compare his size to that of the machine components



With its long reach, the excavator can stack material advantageously, spanning up to three spoil piles placed by the shovel

sion tackle is mounted at the head end of a structural stacker gantry. The top of this gantry is the highest point of the machine, rising approximately 140 ft above the coal.

The machinery which raises or lowers the stacker ladder is mounted on the revolving frame. The stacker conveyor drive machinery is mounted in the superstructure just below the point where the stacker ladder is connected.

Long Reach

Height of the stacker ladder at the discharge point (with maximum 15° elevation) is 112 ft. Compare this with the maximum dumping height of the 950-B which is 74½ ft at 113-ft radius and 45° boom angle.

Despite the elevation and projection of the stacker, it is remarkably free from vibration in operation. In fact, the wheel excavator is relatively vibrationless at every point.

The digging ladder conveyor operates at a rate of 850 fpm and the stacker conveyor runs at 960 to 1000 fpm. The stacker conveyor is operated at a faster speed to prevent pile-up of material at the transfer point from the digging ladder conveyor.

Tension in the belts is maintained automatically by means of a high pressure hydraulic pump unit and cylinder. Adjustment of the tension is accomplished by an electrically operated pressure governor. A safety cut-out switch is also provided in case the belt tension drops to a point where excessive slippage over the drive pulley can occur. The digging ladder conveyor drive is mounted at the inner end of the digging ladder.

The operator's station is located about 60 ft above the coal level in the main superstructure. From the enclosed cab, the operator enjoys an

excellent panoramic view of the entire work area. He has only six levers to manipulate, including a three speed (plus variable) digging control which permits wheel acceleration from 5% rpm to 8 rpm. Power input and output recorders are the only two instruments.

As on the 950-B, the crew consists of only three men—an operator, an oiler, and a ground man.

Auxiliary equipment includes two four-ton traveling cranes mounted over the machinery on the revolving frame, one four-ton traveling crane mounted over the stacker conveyor

drive, a five-ton swinging derrick with live boom mounted on top of the digging ladder gantry, and a two-drum auxiliary winch mounted in the superstructure.

Stripping at Truax-Traer is handled in three shifts, 24 hours per day and seven days per week. A Bucyrus-Erie 100-B shovel (7 cu yd) loads coal in this pit during one shift. A 9-W Bucyrus-Monaghan walking dragline with 10-yd bucket and a Bucyrus-Erie 75-B shovel (5 cu yd) are teamed in the west pit. The third pit is worked by a 750-B stripping shovel (17 cu yd) which was purchased in 1929 by Truax-Traer, and a 75-B coal loader. A fleet of 22 Euclid coal haulers—20-ton and 35-ton capacity—is working at the three pits. They deliver approximately 7000 tons of coal daily to the tippie. Average haul distance is three miles.

An Invitation

A. H. Truax is president and chairman of the board for Truax-Traer. H. C. Livingston is vice-president in charge of operations. R. M. Leseney is mechanical superintendent for all mines. The Fiatt operation, which employs approximately 250 people, is under the supervision of mine superintendent Byron Somers and his assistant, Gene Long. Elmer McCann is the master mechanic and Lloyd Cordray is chief electrician.

Truax-Traer officials extend an open invitation to those interested in seeing the wheel excavator in action. The mine operation is located about 35 miles southwest of Peoria, Ill. The tippie can be seen about a half-mile south as you enter Fiatt, Ill., on Illinois Route 9.



Framed by the excavator is the B-E 950-B stripping shovel with a 30-yd dipper. It removes the lower strata of hardpan shale, and blasted rock

Check Up On Grinding Ball


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Ask the "Ump" why he doesn't allow a scuffed, out-of-round baseball or one with soft spots to stay in play. He'll tell you it handicaps the batter and is a detriment to the game.

In leading mills around the world there are plenty of buyers who will tell you that Sheffield Moly-Cop Balls grind out the lowest cost-per-ton-unit ground. Why? Because of the exceptionally fine balance of toughness and deep hardness, Moly-Cop Grinding Balls keep their shape longer—grind out savings by reason of longer, uniform wear.

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One of Southern Pacific Railroad Company's field geologists operates a potentiometer on a self-potential survey of the Waterman Silver Mine near Barstow, Calif.



Geologist operates a Magnetometer on the Cave Canyon Iron deposit near San Bernardino, Calif.

Systematic Ore Search

Southern Pacific Railroad Initiates 4,500,000 Acre Long-Range Mineral Survey of Their Land Grant

SOUTHERN Pacific Land Co., subsidiary of the Southern Pacific Railroad, has recently initiated a long-term systematic mineral evaluation of their extensive land grant. This consists of roughly 4,500,000 acres in California, Nevada, and Utah. The program was initiated by L. Frandsen, Land Commissioner and W. C. McCulloch, Chief Geologist.

Sigurd K. Herness and Charles E. Melbye of Minerals Exploration Research Corp., Golden, Colo., were engaged as consultants to organize an efficient exploration department for Southern Pacific. They have hired and trained geological-geophysical personnel and will advise on the best exploration procedures as well as assist in the proper interpretation of data. Lawrence B. Wright, former consulting geologist of San Francisco, is full-time director of the exploration program and Keith Meador is assistant director.

Herness and Melbye of Minerals Exploration Research Corp. have recently conducted a six-week training program in the Barstow, Calif., area for the eight Southern Pacific geologists. Stratigraphic section measurement, and detail, semi-detail, and reconnaissance geological mapping were covered, and also the execution of magnetic, self-potential, resistivity, gravity, and radiometric surveys.

The Barstow, Calif., area, was chosen as an ideal training site because of the great diversity of geological features and mineral deposits. Investigations were made of limestone, iron, gold, magnesite, and general contact metamorphic deposits in the

Sidewinder mountains, the tightly folded Paleozoic limestones of the Hinckley anticline, tungsten deposits in the Lane Mountains and Alvord mountains, uranium near Manix, lead-silver and silver-barite veins near Barstow, and the Cave Canyon iron deposits. Geological mapping, together with suitable geophysical methods, was done in each area to evaluate the best combination of methods for a particular type of geology.

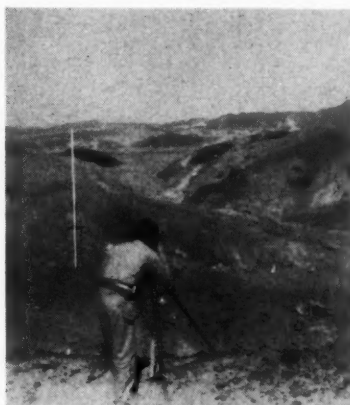
The aim of this systematic training program has been to standardize geological mapping to one system of representation in order that interpretation may be more efficient. Also, MERCO has trained the Southern Pacific personnel in the use of geophysical



Arthur Chew and Keith Meador gather self-potential survey data near Barstow, Calif.

cal methods to facilitate close integration of geophysics with geology. This integration is deemed absolutely necessary in the search for mineral deposits under the vast gravel and volcanic covered areas of Nevada and California in which the Southern Pacific has most of their land grant. Geochemical soil sampling and analysis will be taught at a later date in the Southern Pacific laboratories at Sacramento, Calif. The mineral investigation will include evaluations of all nonmetallic and metallic deposits on Southern Pacific land. Latest exploration procedures will be used where applicable.

Minerals Exploration and Research Corporation is headed by Herness who is a former professor of Geology at the Colorado School of Mines. Associated with Herness are Charles E. Melbye and Gerald E. Gould, both former instructors in geology at the Colorado School of Mines, and Stuart S. Merwin, Fred C. Hohne and Frank Baumgartner—geologists. Their work for Southern Pacific—one of the first projects of its kind on such a scale—is setting a precedent and is being watched carefully by other large land-holding organizations.



This Southern Pacific Geophysical crew is leveling for elevation control on gravity surveys in the Cave Mountains, San Bernardino County, Calif.

AMC Metal Mining—Industrial Minerals Convention

State and District Chairmen Meet to Draft Program for Las Vegas Meeting October 10-13

ANSWERING the call of National Program Committee Chairman L. J. Randall, president, Hecla Mining Co., State and District Chairmen of the Program Committee for the 1955 Metal Mining—Industrial Minerals Convention of the American Mining Congress are meeting this month in Las Vegas to map out plans for the October meeting.

Ever since the appointment of the nationwide Program Committee, suggestions for topics and speakers have been pouring in to the Washington office of the Mining Congress. The wide range of topics covered by these suggestions affords a complete cross-section of industry thinking on matters calling for the attention of mining men, and will enable the Committee to formulate a comprehensive program for the big, three-day meeting at Las Vegas in October. The program for the fall convention will have to be of wide scope in order to do justice to the problems, general, economic, legislative and operating, that are engaging the attention of the industry.

Having determined the general outlines of the program, the committee will ask prominent legislators, leaders in government and prominent industry spokesmen to address the October meeting on national, economic and specific issues confronting the mining industry. On the operating side, the problems of achieving greater efficiency through modern mechanical equipment and advances in technology will be thoroughly aired as leading operators relate their experiences in applying new tools and methods to the task of turning out metals and minerals for America.

Based on the number of suggestions received and comments after the big mining show in San Francisco last year, it will be necessary also to include several sessions devoted exclusively to uranium mining and processing.

American Mining Congress meetings provide the kind of forum where mining men with the practical viewpoint can get together to thresh out the problems with which the industry is faced and help each other to solve them. Each year the discussions at

these conventions become more valuable and each year progressive mining executives endeavor to send as many as possible of their key men—superintendents, engineers, geologists and others responsible for daily operation and maintenance at the mines, to take part in these meetings. Active participation in the sessions and the wide contact with other mining men, experience shows, pays off in better employe relations, renewed enthusiasm and new ideas for improving performance.

Committees at Work

Carrying through the plans for a successful convention requires a lot of detailed work by well organized and ably directed committees. Co-Chairmen of the General Committee for the

W. Wells, president, Wells Cargo Inc. is chairman of the Publicity Committee. Mrs. Hewitt S. West and Mrs. Joseph W. Wells are co-chairmen of the Ladies Hospitality Committee.

Double Opportunity

During the week immediately preceding the American Mining Congress Convention in Las Vegas, the Minerals Beneficiation Division, AIME, will meet in Salt Lake City, Utah. The two programs will supplement one another, affording an opportunity to get full benefit from the two meetings on one trip.

The 1955 Metal Mining and Industrial Minerals Convention is expected to draw a record crowd to Las Vegas October 10-13. The Housing Committee, however, is preparing to take care of all who apply for reservations. There will be no one "Headquarters" hotel. All the hotels on the famous "strip" at Las Vegas, including three new ones just opened, are excellent, and transportation between them by taxicab or shuttle bus is quick



Plans include a trip to the Manganese Inc. plant at Henderson, Nev.

Las Vegas meeting this fall are Roy A. Hardy, consulting engineer in charge, Getchell Mines, Inc. of Reno, Nev., and Hewitt S. West, president, Manganese, Inc. of Las Vegas, Nev. Vice-Chairman of the General Committee is Louis D. Gordon, executive secretary, Nevada Mining Association.

F. A. McGonigle, vice-president and general manager, Manganese, Inc., heads up the Trips Committee. Joseph

and easy. Each hotel has its own night club, swimming pool and casino.

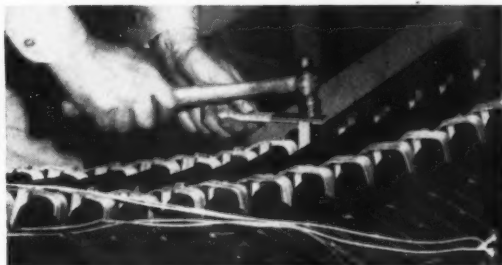
Requests for reservations should be sent to Las Vegas Housing Committee, Las Vegas Resort Hotels Association, P. O. Box 1750, Las Vegas, Nev. Those who prefer motel accommodations should write to Frank Ellis, Sr., president, Las Vegas Motel Association, % Par-A-Dice Inn, 22217 Fremont St., Las Vegas, Nev.

Fast Electrical Repair Service

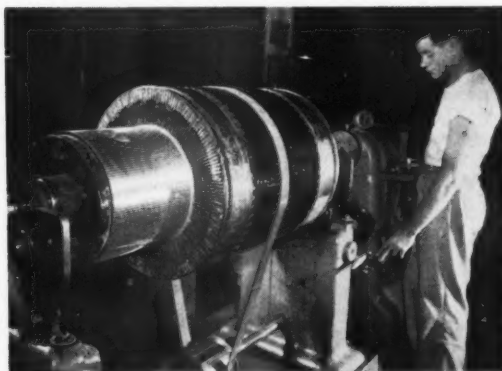
to keep your big stripping shovels on the job



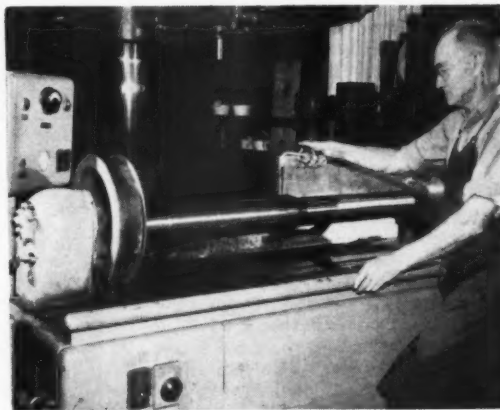
- complete rewinding of M. G. sets, swing, crowd and hoist motors
- mechanical repair and rebuilding and re-machining of mechanical fits.
- skilled field service crews for disassembly and reinstallation of electrical equipment
- redesign to improve performance and eliminate chronic failures



Blocking individual end turns of a stator from a large drag-line M. G. set. This is typical of the care and attention to detail which characterize National rewinding practices.



As a matter of course, all rotating elements are dynamically balanced to insure vibration-free operation.



Testing an armature shaft to detect possible fatigue cracks and flaws. This is typical of the many tests given your equipment to insure long life under severe operating conditions.

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ELECTRICAL ENGINEERS MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

Operators Corner

INSTRUCTIONS for selecting and installing variable speed pulley systems for industrial power take-off have been issued by Equipment Engineering Co., Minneapolis, Minn. The company lists seven steps in the process of securing the correct pulley system for the user's application.

First step is to choose the proper pulley and motor base. This depends on the size motor used, and charts are available from the company to assist in the selection, with the horsepower section sub-divided into 1750, 1150 and 860 rpm. Second, establish size of the companion sheave by consulting

speed range tables or by using this formula: pitch diameter (P.D.) of driven sheave equals $\frac{\text{motor rpm}}{\text{driven rpm}} \times \text{P.D. of variable speed pulley}$.

Third, measure the center distance between the motor shaft and the driven shaft, making sure there will be enough travel on the motor base to obtain the complete speed range. Center distance (C) can be obtained by using the following formula: $C = \frac{D+d}{2}$,

with D being the diameter of the large sheave and d of the small sheave.

Belt length, step four, can be found by referring to a belt manufacturer's catalog or by the following formula: belt length = $2C + 1.57 (D+d) +$

$\frac{(D-d)^2}{4C}$. Next, start assembly by securing the motor base to its mooring, bolt the motor to the base, place the pulley on the motor shaft and the belt over the pulleys.

Step six—turn the motor on and rotate motor base handwheel until pulley is at its minimum speed position (where belt is just off the pulley hub). Stop collar on motor base rails is then set to prevent the possibility of excessive belt tension. Set the stop for maximum speed position by turning the handwheel until the belt is flush with the outside diameter of the pulley faces. Last step is to begin operation.

Tractor Tips

TRACK-TYPE tractors are designed to work in all kinds of terrain and in very adverse conditions. Their tracks allow them maximum traction and flotation in mud, sand and other soft materials. Powerful diesel engines provide plenty of power for traversing steep grades and rough terrain that are hard for a man to travel on foot. In addition, seals, guards, and other safeguards assure that the track-type tractor can operate under these adverse conditions safely without unnecessary wear and tear on its working parts.

Many times however, unusual operating conditions will make necessary special attention to the transmissions of the machines. Slightly different operating procedures should also be employed to keep the tractors performing their best.

Many smaller track-type tractors are equipped with splash lubrication systems for the transmission and bevel gear compartment. When operating on extreme slopes, the top shaft bearings in the transmission do not receive as much lubricant as they would if operating on level ground, and bearing life may be shortened.

When the tractors are to be operated for extended periods of time under these conditions, extra oil should be added to the transmission to extend the bearing life. If extra lubricant is undesirable or is not im-

mediately available, operators should maneuver the tractor sideways every once-in-a-while to increase the lubrication. Experience indicates that such sidewise maneuvers performed every 500 to 1000 ft measurably extend transmission bearing life.

Track-type tractors with forced-fed lubrication systems in the transmissions will also benefit from added transmission oil or sidewise maneuvers when they are operated down slopes for extended periods of time.

The machine operator who gives more attention to the tractor that has to be operated under abnormal conditions, will add considerably to its life. Special care will shorten "down time" and minimize operating costs.



When operating track-type tractors on extreme slopes care should be taken to protect transmission bearings



Wheels of GOVERNMENT



As Viewed by HARRY L. MOFFETT of the American Mining Congress

THE legislative tempo has stepped up and Congressional leaders have their eyes on a mid-summer adjournment date. Major legislation is beginning to trickle onto the floors of both Houses, and Congress is clearing the appropriations measures rather expeditiously. These usually are stumbling blocks to speedy adjournment.

Two of President Eisenhower's major legislative proposals have run into difficulty. The House failed to approve his military reserve program while the Senate substituted a Democratic proposal for the Administration's huge highway construction plan.

Prompt Senate action is expected on a House-passed measure extending the Renegotiation Act until December 31, 1956. The measure, when approved, will again carry an exemption for mineral raw materials.

Hearings are continuing before a Senate Labor Subcommittee on proposals to hike the minimum wage rate and to expand coverage of the Wage-Hour law to bring millions of retail workers under its provisions. The Administration has reiterated its request not only for a higher rate but for expanded coverage. Most observers feel that the rate will be raised from 75 cents to 90 cents an hour.

Standby authority to control prices and wages in event of a national emergency is not in the offing. The President has announced that he is not planning to seek such authority at this time.

Mining Law Revisions Ahead

At this writing the outlook is for early action by Congress to revise the Materials Disposal Act and the General Mining Laws to curb abuses which have plagued the mining industry for the past 20 years.

Identical measures in the House and Senate (H. R. 5891 and S. 1713), which would eliminate these abuses without disturbing the basic principles of the mining laws, appear to be headed for prompt enactment. Hear-

ings have been held before both the Senate and House Interior Committees, at which representatives of the Agriculture and Interior Departments, officials of organizations representing conservation groups, the lumber industry, the livestock industry, and mining endorsed the proposals.

Leading off the testimony before the Senate Committee, R. B. Holbrook of Salt Lake City, Chairman of the Public Lands Committee of the American Mining Congress, declared that the Mining Congress has been "very much concerned about the problem of mining locations which have been attempted for a purpose other than the recovery of minerals" and "has never condoned the making of such locations and, on the contrary, has urged the use of available procedure to defeat them."

Reviewing the proposed legislation, Holbrook pointed out that the United States, in its management of the surface resources of mining claims hereafter located (and of mining claims heretofore located under which surface rights may not be asserted or established), may undertake only those activities which do not "endanger or materially interfere with established mining operations or related activities." He told the Committee that mining rights under existing valid mining locations will not be affected by enactment of the bill, unless a mining claimant voluntarily waives surface rights not required in his mining operations. He also emphasized that when a claim is patented, the miner, as in the past, would acquire full title to the claim and all of its resources.

Holbrook declared that "it is the considered opinion of the American Mining Congress, and of myself, that enactment of the legislation before you would be in the public interest." Continuing, he stated: "In our opinion, it will not impede mineral discovery or development on the public domain. We believe that it will protect mining claimants in their use of unpatented mining claims for prospect-

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Washington Highlights

MINING LAW: Revision favored.

TRADE ACT: Extension in conference.

TAX CHANGES: Approved by Congress.

NATURAL GAS: Committees study proposals.

MINERAL PURCHASES: To be continued.

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ing, mining and processing operations, and uses reasonably incident thereto. The bill will impose upon the holders of future unpatented mining claims limitations and restrictions which have not applied in the past; but we recognize that the improper actions of a minority of those who have located mining claims have created problems; and we feel that the legislation will serve to remove the bases of those problems without destroying the vital principles under which the mineral resources of this nation have been developed. We also believe that it will contribute to the best utilization of our nation's natural resources."

Proposed amendments were offered on behalf of the Department of Interior which would: (1) make the legislation apply to the Revested Oregon & California Railroad grant lands and the Coos Bay Wagon Road grant lands with the revenues from those lands disposed of as under existing law; (2) provide that the head of any Federal Department or agency may initiate action to resolve surface title uncertainties of heretofore located mining claims; and (3) make it certain that the bill would not limit or repeal any existing authority to include any limitation or restriction in patents hereafter granted. The Agriculture Department also expressed approval of these amendments.

During the course of the Senate hearing, Senator Eugene Millikin (Rep., Colo.) indicated that he would offer an amendment which would provide that in the event timber was removed from a valid claim by the United States, the owner of the claim would be entitled to obtain timber required for his mining or related operations from other lands in the vicinity of his claims. Indications are that this safeguard to mining claimants will be adopted in the measure.

Hearings before the House Interior Committee were brief, with most of the same industry and Government witnesses submitting statements in support of the bill. On May 20 the subcommittee on Mines and Mining, which held the hearings, reported the bill favorably to the full Committee, after adopting the suggested amendments of the Interior Department. The full House Interior Committee sent the bill to the House floor on May 24 and quick approval is expected. The Senate Committee is likewise expected to send the measure to the floor in the near future.

Trade Act Extension

Early in May, by a whopping vote of 75 to 13, the Senate approved H. R. 1, the Trade Agreements Act extension measure, as amended by its Finance Committee, and the bill is now in conference to iron out the differences between the House and Senate versions. Most observers predict that the bill will be sent to the White House before the June 12 terminal date.

As approved by the Senate, the bill would: (1) extend until June 30, 1958, the authority of the President to enter into trade agreements, (2) grant additional authority to the President to reduce tariffs by 5 percent during each of the next three years, (3) permit the President to restrict imports if necessary to afford protection to industries essential to national defense, and (4) strengthen the "escape" clause provision of existing law to provide that increased imports shall be considered as threatening serious injury to an industry if the Tariff Commission finds such imports have contributed materially to such injury or threat of injury.

Conferees on the measure have reached agreement on all of the Senate amendments except the so-called "national security" amendment and the changes in the "escape" clause provision. They are expected to iron out these two questions shortly, with the view prevailing in Washington that these amendments will appear in the final bill.

Tax Changes

Congress has stamped its approval on a measure repealing Sections 452 and 462 of the 1954 Internal Revenue Code which dealt with prepaid

income and the setting aside of reserves for estimated expenses.

These provisions came under fire earlier this year as the result of claims that they would reduce Federal revenues by up to a billion dollars in the current year, instead of the estimated loss of \$47 million suggested at the time of their enactment last year. Treasury Secretary Humphrey had urged repeal of the two sections, stating that it was never intended that they should result in any substantial loss of revenue or in "windfalls" to taxpayers.

Section 452 allowed accrual-basis taxpayers to defer reporting of advance payments as income until the year or years in which the income is earned. Section 462 permitted the setting aside of reserves for estimated expenses by allowing accrual-basis taxpayers to deduct reasonable additions to reserves for future expenses.

In reporting the bill to the Senate, the Finance Committee expressed the hope that the principles of the two sections could be restored in the Internal Revenue Code after further study by Congressional and Treasury tax experts.

Meanwhile, the House Ways and Means Committee has deferred consideration for this session of a number of "non-controversial" errors in the 1954 tax law which had been submitted to it by the Treasury Department. It is likely that no major changes will be made in the Code this year.

Import levies have also received consideration in Congress. The House has approved a bill to suspend the two cents a pound copper import tax for another three years, through June 30, 1958, and both the House and Senate have passed a measure to continue until June 30, 1956, the suspension of import levies on metal scrap except lead or zinc scrap. The copper import duty suspension bill has been reported favorably to the Senate by the Finance Committee, and is expected to be approved promptly. The measure would make no change in the present law's requirement that the President reimpose the duty when the price of copper falls below 24 cents a pound for any calendar month.

Natural Gas Regulation

Both House and Senate Interstate and Foreign Commerce Committees are working on legislation to amend the Natural Gas Act. Bills under study in both Committees would exempt independent gas producers from regulation by the Federal Power Commission, established gas conservation standards for the guidance of the FPC, give the FPC jurisdiction over direct sales of natural gas to industrial consumers, eliminate below-cost sales of natural gas to industrial consumers, and make imports of natural

gas subject to the same standards as apply to domestic pipelines.

Hearings have been concluded by the House Commerce Committee and it is now drafting a bill for submission to the House.

The Committee has turned down a proposal for Federal regulation of gas sales made directly by pipeline companies to industrial consumers. This proposal was sponsored by Rep. Staggers (Dem., W. Va.) and had the support of the coal industry. However, the Committee has adopted another proposal made by Rep. Staggers and also strongly advocated by the coal industry, which directs the Federal Power Commission, in administering the Natural Gas Act, to consider among other things the maintenance of enough productive capacity in all domestic fuel industries to meet the current and long range fuel needs of the nation. This provision also calls for the FPC to consider sound principles of conservation in order to preserve the available reserves of natural gas for purposes which will afford maximum long range benefits to the country, with due regard for conservation policies and regulations of the producing State.

The House Committee is expected to have a measure ready for floor action during the month.

Hearings continue in the Senate and the coal industry is scheduled to set forth its views early this month.

Mineral Purchase Programs

Legislation to extend the domestic purchase programs for tungsten, manganese, chromite, mica, asbestos, beryl and columbium-tantalum ores, scheduled to terminate June 30, 1958, is making progress in both Houses of Congress.

In the Senate, the Interior Committee has favorably reported a measure, sponsored by Senator Barry Goldwater (Rep., Ariz.) and several others, which would continue the purchasing programs through June 30, 1968, and require the Government to buy as much of the minerals as may be offered by domestic producers at prices no lower than those now in effect under the programs. It is understood that should this bill be enacted by the Congress it would probably meet with a Presidential veto.

Over in the House, an Interior Mines and Mining Subcommittee has put its stamp of approval on a bill by Rep. Engle (Dem., Calif.) which would boost present goals for the minerals but would not change the scheduled expiration date of the existing buying programs. The bill is reported to be an "interim measure," designed to continue the various programs until the newly-created Office of Minerals Mobilization is able to conduct studies and recommend a mobilization base and legislative pro-

(Continued on page 92)



Personals

Andrew Fletcher, president of the St. Joseph Lead Co., New York, was elected president of the Lead Industries Association at its Twenty-seventh Annual Meeting in Chicago



Andrew Fletcher

April 28. Fletcher succeeds J. B. Haffner, former president of the Bunker Hill & Sullivan Mining and Concentrating Co. of Kellogg, Idaho. Representatives of the lead mining, smelting and manufacturing industries elected as vice-presidents were: K. C. Brownell, president, American Smelting & Refining Co., N. Y.; J. A. Martino, president, National Lead Co., N. Y.; and M. M. Zoller, vice-president, The Eagle-Picher Co., Cincinnati, Ohio. Robert L. Ziegfeld was reelected secretary-treasurer.

Clinton C. Cornelius has been named operating vice-president of the Baton Coal Co. with offices in Pittsburgh, Pa. He formerly was general superintendent of the company.

Baton Coal Co. operates the Carpentertown mine of the Carpentertown Coal & Coke Co. in Westmoreland County, Pa.

Byron E. Grant, mining consultant of Salt Lake City, has been newly appointed assistant general manager of the Braden Copper Co., Chile.

Grant, formerly assistant to the vice-president and general manager of western operations of the United States Smelting Refining and Mining Co., resigned that position in November 1954, to become a private mining consultant.

William Blizzard, president of United Mine Workers District 17, retired March 31, ending 36 years of official association with the mine union. Blizzard had been district president since 1945.

Charles Will Wright, vice-president, World Mining Consultants, Inc., has opened a Washington service bureau for the organization at 1025 Connecticut Ave., Washington 6, D. C. He is assisted by Robert Loft Hartzell,

industrial economist and business manager. The Washington office will undertake research studies and obtain authoritative reports on: geology and mineral resources of a given area; minerals beneficiation practices for specific minerals; market history and present trends of a mineral product; mining codes, taxes, legislation affecting mining in a foreign country, and patents and licenses of mineral processes in the United States and abroad.

Frank R. Amos, vice-president and general counsel of Pittsburgh Consolidation Coal Co., retired April 30. He had served as vice-president since 1948. Prior to that time he was consulting counsel for the company in West Virginia. Amos is now associated with the law firm of Thorp,



F. R. Amos



John Corcoran

Reed & Armstrong, and acts as associate counsel for Pitt Consol.

John Corcoran, an assistant vice-president since 1950, succeeded Amos as vice-president and company counsel. He came to Pitt Consol from the Pittsburgh legal firm of Rose, Rose & Houston.

According to A. J. O'Connor, vice-president and general manager, Consolidated Coppermines Corp., Ely, Nev., Harry M. Brindle has been advanced to chief engineer. He was assistant chief engineer. Brindle succeeds Harold W. Bishop who resigned.

Woodward J. Latvala was appointed assistant chief engineer to succeed Brindle. Prior to joining Coppermines' staff, Latvala was mine superintendent at open pit operations of Reynolds Jamaica Mines, Ltd., Jamaica, B. W. I.

R. A. Maurer, formerly superintendent for the C. H. Mead Coal Co., has been named general manager of the

West Virginia properties of North American Coal & Dock Co.

In another change within North American, it was announced that J. W. Hurley has retired as vice-president in charge of production for C. H. Mead Coal Co. and Red Parrot Coal Co., divisions of North American. J. H. Hurley has been promoted from acting superintendent to superintendent of the C. H. Mead mines at East Gulf, W. Va.

The American Zinc Institute, at its 37th Annual Meeting held in Chicago April 28, elected F. S. Mulock, president of American Smelting Refining & Mining Co., its president.

Three vice-presidents were also elected. They were: C. M. Chapin, Jr., vice-president, St. Joseph Lead Co.; R. G. Kenly, vice-president, New Jersey Zinc Sales Co.; and E. H. Snyder, president, Combined Metals Reduction Co. Erle V. Dovel, American Zinc, Lead & Smelting Co., was reelected treasurer. John L. Kimberly and E. V. Gent continue as secretary and executive vice-president respectively.



F. S. Mulock

R. S. Walker, owner and general manager, Bradford Coal Co., Bigler, Pa., has announced the advancement of Charles O. Fowler, Sr., from general sales manager to assistant to the general manager.

John Sherwin has moved into the top position at Pickands Mather & Co. as senior partner in the realignment of officials following the recent death of Elton Hoyt II. H. C. Jackson and A. D. Chisholm are now managing partners of the company.

Some changes in the operating department of Universal Atlas Cement Co. have been announced by W. O. Lawrence, assistant vice-president and general operating manager of this United States Steel Corp. subsidiary.

Martin E. Linquest has retired as manager of the Duluth, Minn., plant and has been succeeded in that position by Roald W. Nygaard. Linquest has been plant manager since 1951 and is leaving the company after 46 years of service. Nygaard moved to Duluth from the company's Buffington, Ind., plant, where he was assistant plant manager.

L. J. Boucher, plant manager of the Northampton, Pa., plant, also retired after 30 years of service with the company. Raymond W. Smith, assistant plant manager at Northampton, was appointed to succeed Boucher.

Professor **Eugene Pfeider**, head of the Department of Mineral Engineering at the University of Minnesota, will spend six weeks this summer visiting some eight Schools of Mines in Sweden, Germany, France and England. He also plans to visit various principal mining districts, particularly the iron ore producing areas of Sweden.

Professor Pfeider's itinerary will also include the Centenary Congress of the Societe De L'Industrie Minerale, as well as the International Exhibition of the Mining Industry, being held in Paris from June 18 to July 3. After his return, Professor Pfeider will spend the rest of the summer consulting for Freeport Sulphur Co. on its Moa Bay Project, Cuba.

Alvin W. Knoerr has been named editor of *Engineering & Mining Journal* and *Metal and Mineral Markets*, succeeding **Robert H. Ramsey**, who has resigned to join the staff of the St. Joseph Lead Co. in New York. Ramsey joined E & M J in 1942 and became editor in 1952. Knoerr joined the staff in 1944 and since that time has served as associate editor and managing editor.

William L. Walsh has been appointed assistant to the president of Kennecott Copper Corp., according to announcement by Charles R. Cox, president. His duties will be in the field of the corporation's titanium interests.

A graduate of Boston College in 1931 with an A.B. degree, Dr. Walsh also received from the Massachusetts Institute of Technology the degrees of M.S. in chemistry in 1933 and Ph.D. in chemistry in 1936.

He joined the staff of General Aniline & Film Corp. as a research chemist in 1936 and since that time has held succeeding important posts with that corporation, his most recent being manager of manufacturing.

Fred B. Bullard has been named executive secretary of the Hazard Coal Operators Association, Hazard, Ky. Bullard succeeds **William B. Sturgill**, who resigned in February to become executive vice-president of the Columbus Mining Sales Co.

Alfred G. Hurley has been promoted to safety supervisor of The Cleveland-Cliffs Iron Company's Mesabi Iron Range operations, Hibbing, Minn. He succeeds **George R. Whittington**, who

retired March 15. Whittington is the first Cleveland-Cliffs employee on the Mesabi Range to complete 50 years of service with the company. He started at Negaunee, Mich., in 1905.

Robert S. Stevenson has been elected president of Allis-Chalmers Mfg. Co., Milwaukee, Wis., to succeed the late **William A. Roberts**. Stevenson has been executive vice-president of the company since July 1955.



He started with Allis-Chalmers in 1933 as salesman in the Tractor Division. In 1935 he was appointed assistant manager of the Omaha, Nebr.,

branch and in 1936 was transferred to the home office in Milwaukee. In 1951 he was appointed vice-president of the Tractor Division and was elected to the Allis-Chalmers board of directors that same year.

Robert Cooper, assistant district superintendent for U. S. Steel Corp. mines in McDowell County, W. Va., has retired after almost 39 years of service with the company. Cooper began his long association with the steel corporation in 1916 as a clerk in Gary, W. Va. He was later made assistant superintendent of the firm's Gary Nos. 7, 8 and 9 mines, and was promoted to superintendent and assigned to mines Nos. 4, 5, 10 and 12 in 1939. In 1953, he was made assistant district superintendent.

Appointment of **Matthew R. Banovetz** as superintendent of pelletizing at its Babbitt, Minn., Plant has been announced by Reserve Mining Co. Banovetz began working with Reserve in 1951 as an accounting clerk. He was advanced to furnace tender in 1952, and was then promoted to foreman in 1953.

The Tasa Coal Co., Pittsburgh, Pa., has elected **H. B. Salkeld** chairman of the board. **Preston H. Vestal**, formerly executive vice-president, has been elected president of the company, succeeding Salkeld.

Donald D. Smith has been elected president and chairman of the board of the Central Eureka Corp., San Jose, Calif. Smith succeeds **H. J. McPherson** who resigned as president but continues as a member of the Board of Directors. At the regular meeting of the Board of Directors, Smith expressed optimism on the company's efforts to enter the uranium mining field.

Elmer L. Wiley, formerly safety director of the West Virginia Coal & Coke Co., Omar, W. Va., has been named to head a new division-wide safety organization at Kennecott Copper Corporation's Chino Mines Division. **W. H. Griffiths**, Chino general manager, made the announcement. Wiley has been in safety work for more than 15 years and was with the West Virginia Coal & Coke Co. for more than nine years, before joining the Chino Division.

Gordon McMillan, former mine foreman at the Brittanica Beach, B. C., properties of Howe Sound Co., has been appointed general superintendent at Eureka, Utah, for Chief Consolidated Mining Co.

Russell Harman has been elected vice-president and controller of Princess Elkhorn Coal Co. and the Powellton Coal Co. Princess Elkhorn operates mines at David, Ky., and Powellton has mines at Mallory, W. Va. Harman retains his position as secretary and treasurer of both companies.

The election of **C. Hyde Lewis** as president of the New Idria Mining and Chemical Co. has been announced. A veteran of 33 years in the mining



industry, Lewis joined New Idria in 1936 and subsequently was named general manager and elected a vice-president of the company. He began his career with the Phelps Dodge Corp. in 1922 following graduation from the University

of California as a mining engineer. He later worked with H. W. Gould & Co. and the Getchell Mining Co.

Pittsburgh Consolidation Coal Co. recently announced the election of **Benjamin F. Fairless** to the company's board of directors.

Two veteran Texas Gulf Sulphur Co. executives have recently retired. They are **A. G. Wolf**, vice-president in charge of the exploration department and **F. R. C. Brown**, manager of the land department. Wolf was succeeded by **Dr. C. F. Fogarty**, who has been appointed manager of the geological department. Brown has been succeeded by **J. Frank Lewis**.

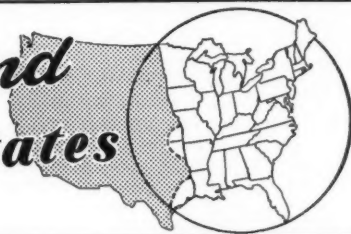
Election of **William R. Dougan** as vice-president (sales) by the Board of Directors of The Philadelphia and Reading Coal and Iron Co., effective June 1, 1955, was announced by **Edward G. Fox**, president. Dougan succeeded **Clyde H. Stephens** who retired May 31, 1955.

NEWS

and VIEWS



Eastern and Central States



Virginia Manganese

Charles W. Massie, mining engineer of the Virginia Department of Conservation & Development, has predicted that about twice as much high grade manganese ore will be produced in Virginia mines in 1955 as was produced there in 1954. In 1953, Massie said, 7548 long tons averaging 42.44 percent manganese were shipped from the state. In 1954, 20,240 long tons averaging 43.24 percent were shipped—largest amount shipped from Virginia in any one year except 1887, when 21,008 long tons were shipped from the old Crimora Mine in Augusta County.

Iron Miners Meet

Lake Superior Mines Safety Council held its 31st annual Mine Safety Conference in Duluth, Minn., on May 19 and 20. E. C. Norris, Jr., president of the Council and supervisor of Industrial Relations, Northern Ore Mines, Republic Steel Corp., opened the meeting and the Hon. George D. Johnson, Mayor, City of Duluth, delivered the welcoming address.

With the exception of the banquet on Thursday evening, the rest of the two-day program was given over to papers on various aspects of Safety in Mining—from management's viewpoint, from the foreman's viewpoint, in plants, in open pit mines and in underground mines.

At the banquet Harold A. Grinden, Duluth Chamber of Commerce, was

toastmaster. K. W. Haagensen, director of public relations, Allis-Chalmers Mfg. Co., spoke on "Human Relations—Foundation for Safety."

Glen Alden In Texas

Glen Alden Coal Co., a producer of Pennsylvania anthracite, has acquired a Texas firm which makes heating and air conditioning equipment. This marks the first step in Glen Alden's program to diversify and expand its operations, a program approved by stockholders earlier this year.

The newly purchased firm is the Mathes Co. of Fort Worth, Tex. It manufactures heat pumps, house air conditioners, room coolers, cooling apparatus for restaurants and similar establishments and fans. It operates three plants—one a sheet metal appliance installation at Marble Falls, Tex.; the second, a wood-working, veneer and plastics plant at Center, Tex., and an assembly plant at Fort Worth.

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N & W to Transfer Coal Mine

In late May the Norfolk & Western Railroad announced that it expected to transfer its Pond Creek Colliery near Williamson, Ky., to the Osborne Coal Mining Corp. According to the announcement, Osborne, operating as a sub-lessee of the railroad, would continue to run the mine uninterrupted.

Furthermore, a railroad spokesman said, Osborne will add a cleaning plant to the operation at Goody, Ky., and will produce both locomotive and commercial grades of coal.

N. J. Zinc Developments

In the magazine *Zinc*, published by the New Jersey Zinc Co., it is reported that during the next few years, New Jersey Zinc will bring into production four new mines and will have opened up additional orebodies in all presently operating mines. The new developments are at Friedensville, Pa.; Mineral and Ivanhoe in Virginia; and at Jefferson City, Tenn.

Already more than 10 years in the making, the company reports that the completion of this program will boost its ore productive capacity to the highest level in its 107-year history.

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Plan Coal Pipeline

George H. Love, president of Pittsburgh Consolidation Coal Co., recently told stockholders of his company that the output of soft coal may be about one-eighth larger this year than it was in 1954. Thus he predicts a 450,000,000 ton year versus 395,000,000 tons in 1954.

Love went on to say that the company hopes to get started within a few months on building a pipe line to transport coal from its main Ohio operation near Cadiz to market in northeastern Ohio. The project would cost an estimated \$9,000,000 and would take 18 months to build. When completed it would have the capacity to transport a minimum of 1,200,000 tons annually.

The occasion for Love's remarks was the annual meeting of the company in Pittsburgh on April 21.

Big Coal Producer

The Itmann mine of Pocahontas Fuel Co. was the largest coal producer in West Virginia last year. It promises to be even larger this year. The mine, located at Itmann, W. Va., produced 2,144,046 tons of Pocahontas No. 3 coal last year, to rank fifth in the United States in tonnage and first in the state. Early in May, the

company added a third operating shift at the mine and its cleaning plant. About 180 additional men were hired, bringing the Itmann force to about 880. This additional working force should insure a sizable increase in production from the mine in 1955.

Consider New Cement Plant

Dragon Cement Co. has under consideration the construction of a large cement plant in West Stockbridge, Mass. Final decision on the plant, it is said, depends upon three considerations: whether adequate supplies of limestone are found upon the property; whether governmental bodies will cooperate in granting necessary permits; and whether the cement demand will continue high.

Cleaning Plant Expansion

Guyan Eagle Coal Co. has announced planned expansion of its coal preparation facilities at the Proctor No. 1 mine, Amherstdale, W. Va.

Plans call for the addition of McNally Norton washing equipment to clean 317 tph of 1½-in. by 0 coal. Existing cleaning equipment will be altered to permit the crushing and re-washing of middlings with additional dewatering, classification and blending equipment.

Move Stripping Shovel

Truax-Traer Coal Co. is constructing a 23 cu yd stripping shovel at its Marfork, W. Va., operations.

The shovel will be used to strip overburden from the outcrop of the Dorothy seam. There is presently a deep mine on the property, and it is planned to follow the stripping operations with augers to recover as much of the coal as possible.

The shovel being constructed is not a new one. Originally built around 1929 by Bucyrus-Erie Co.—it is being modified as it is re-erected. Previously used on the company's property at Pinckneyville, Ill., the shovel has been shipped piece by piece to the Raleigh County operation. About 26 railroad cars in all were needed to complete the transfer.

We Salute Them

Fourteen Medals of Honor for heroism in saving life in the mineral industries were awarded by the Joseph A. Holmes Safety Association at its annual meeting in Washington on April 26. One Certificate of Honor for skill in using modern life-saving methods in an emergency also was awarded.

In addition, the association awarded 472 Certificates of Honor for exceptional safety records and outstanding success in supervisory work. These included certificates for 200 individuals, of whom 52 are officials, 83 coal mines and companies, 75 metal mines and companies, 89 petroleum plants and companies, 21 quarries and non-metallic mines and companies, and four miscellaneous organizations.

The heroes include a lieutenant in the United States Navy who entered an underground mine for the first time in his life to save a miner overcome by gas, an oilfield worker who twice entered a gas-filled well cellar to rescue two unconscious men, and a miner who escaped after a mine explosion, then went back into the smoke of the blast to lead three injured fellow workers to safety.

Those honored for saving life are: Lt. (J. G.) Billy O. Scroggins, United States Navy, Natchitoches, La. Chester L. Camp, Winnfield, La.

R. H. (Bobby) Thompson, Beauregard Parish, La.

Mauril Carriers, Beauregard Parish, La.

Robert M. Daugherty, Wyoming, W. Va.

Donald Salter, Bagdad, Ariz.

Frank Sims, Mammoth, Ariz.

Rafael Salgado, San Manuel, Ariz.

Joseph Carr, Elm Grove, W. Va.

Charles Antonelli, Pottsville, Pa.

Stephen Marcovitch, Pottsville, Pa.

George A. Collins, Bonanza, Utah.

Joseph Postma, Bonanza, Utah.

Richard Wells, Wheelwright, Ky.

Nathan Fleming, Wheelwright, Ky.



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side rental work. Horizontal or vertical truck-mounted drills carry 6-foot auger sections on the vehicle. A two-man crew averages 1500 feet per day drilling blast holes of different depths.

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—Correction—

There was an error in the list of members of the American Mining Congress Manufacturers Division (April, page 65). Cleveland Rock Drill Division is a part of the Westinghouse Air-Brake Co., not General Motors Corp.

Option Gypsum Deposits

An option on several hundred acres of newly discovered gypsum deposits in Martin County, Ind., has been acquired by the Ruberoid Co. of New York. The company reportedly will build a plant a short distance from where the U. S. Gypsum Co. has started preliminary drilling operations. National Gypsum Co. is also opening a mine and plant in the area.

Finish Safety Course

Over 2000 spectators from Lynch, Ky., and neighboring communities joined officials from the United Mine Workers of America, U. S. Bureau of Mines, Kentucky Department of Mines and Minerals and the United States Steel Corp. in paying tribute to 1784 United States Steel employees. The men had maintained a 100 percent attendance while participating in the U. S. Bureau of Mines accident prevention course. All of the miners and supervisors of the Lynch district's No. 30-31 mine, No. 32 mine and the outside force completed the 20-hr accident prevention course.

White Pine Copper Days

Ontonagon, Mich. honored the president of White Pine Copper Co. June 11 for his part in the economic development of the Upper Peninsula community.

June 9-11 was proclaimed "White Pine Copper Days" in observance of the beginning of full-scale copper production at the \$80,000,000 operation. The town also proclaimed June 11 as "Morris F. LaCroix Day," and on that day the White Pine president will be honored by state and local leaders.

Other events during the three-day celebration include a nightly pageant depicting the history of copper mining in the county, a parade, special window displays, and a banquet.

Today, White Pine is producing about 8000 tpd of ore with the mill processing, by flotation, about 9200 tons and the smelter producing 65 tons of blister copper. This one mine has more than doubled copper production in the Upper Peninsula.

Prior to World War I, White Pine had yielded considerable ore from a native copper deposit, but until several years ago the mine had lain dormant. Early in 1942 the government asked Copper Range Co. to make a

study of the cost and feasibility of a partial development of its White Pine ore body.

The multi-million dollar project result of this and subsequent studies includes a modern village housing 1000 workers and their families. The company has invested \$13,000,000 in private capital in the project and \$67,000,000 through the RFC.

Attorney Lawrence P. Walsh, member of the Michigan Economic Development Commission, headed the Ontonagon committee for "White Pine Copper Days."

Sulphur Plant

Sulphur Exploration Co. has acquired sulphur rights to the High Island dome in Galveston County, Tex. The sulphur company is expected to build a plant on the dome.

First, however, plans are to drill at least seven wells on the property to determine the extent of sulphur structures on the dome. Construction of the plant will begin sometime within the next three months, it is reported. A daily capacity of about 500 tons is expected.



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Cleaning Plant Record

The Hanna Coal Co. Division of Pittsburgh Consolidation Coal Co. is in the habit of breaking records. The achievements of their large stripping shovels and overburden drills in this respect have been given wide publicity. Now the Georgetown preparation plant is added to the list.

Opened in 1951, the eastern Ohio plant had a rated capacity of 1500 tph of raw coal. Since then, capacity production has been commonplace, and record production shifts have been frequent. Best shift record so far in the plant's history was made on the afternoon shift of February 23, 1955, when 13,242 tons of raw coal were processed. This made an average of some 1850 tph of raw coal, roughly 23 percent above rated plant capacity.

C&H Diversifies

Calumet & Hecla, Inc., has agreed to an offer to exchange shares of its stock for the stock of the Goodman Lumber Co., Goodman, Wis. This transaction would make the Goodman Lumber Co. a subsidiary of Calumet & Hecla.

Calumet & Hecla does not contemplate changing the Goodman operations or personnel and the forest operations will continue on a sustained yield basis. The annual increment of timber growth will be harvested by selective cutting.

The Goodman Lumber Co. is an important producer of northern hardwood lumber, dimension stock and veneer. It has 70,000 acres of forest lands in Wisconsin, and operates a sawmill, a veneer mill, and a planing mill.

Jonsmith Extends Ore Area

Seven more diamond drill holes put down by Jonsmith Mines on its New Dominion property in the Sudbury nickel area in Ontario, Can., have returned ore grade intersections, President E. C. MacLeod advises.

Four of the holes were in the west ore area and returned widths ranging to 22 ft and good values in combined nickel and copper. Another hole returned a width of 15 ft of mineralized core but the metal content was below ore grade.

In the central ore zone area three holes returned widths ranging to 21.2 ft of commercial ore. In this area also a fourth hole cut the zone with the grade low.

As drilling in these two sections continues it appears that a fairly substantial tonnage of good grade ore is being outlined. Two of the holes in the west ore area showed two sections, both of ore grade.

The first hole drilled to test the theory that the faulted extension of the ore previously mined under a leasing arrangement with Milnet

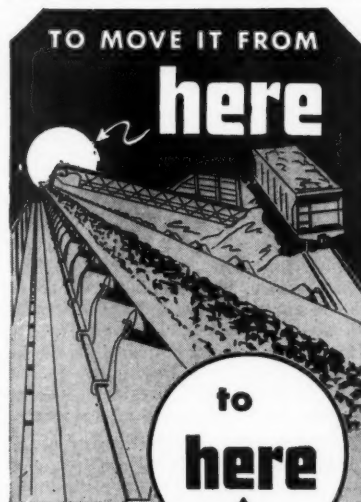
would be found at greater depth missed its target when the drill hole flattened. Another hole has been started. If the same flattening difficulty is encountered a crosscut will be driven 800 ft from the bottom level to establish better located drilling stations.

25 Years At Wheelwright

April 1 marked the completion of 25 years of coal mining operations by the Inland Steel Co. at Wheelwright and Price, Ky. This event was marked by appropriate ceremonies on April 16 in the auditorium of the Wheelwright High School. Principal feature of the ceremony was the presentation of watches, suitably engraved, to 57 employees who have served Inland continuously for the 25 years. Carl B. Jacobs, manager of Inland's Raw Materials Department, made the presentations.

Australian Iron Ore

It is reported that promising new finds of high grade iron ore suitable for steel making have been found on the northern slopes of Iron Knob in South Australia. The find is the result of a program of exploration aimed at establishing reserves of high grade ore outside those already leased to the Broken Hill Pty. Ltd.



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Diesels Aid Coal Mining

Six new General Electric diesel-electric locomotives are helping the Panther Valley Coal Co. of Lansford, Pa., to bring coal prices down to what is considered a satisfactory sales level, and allow the company to operate profitably.

The Panther Valley Coal Co., principal producer of Old Company's Lehigh Coal, operates anthracite properties in the lower anthracite fields of Pennsylvania. The Lansford breaker processes coal mined and stripped from the coal lands formerly making up the Lansford and Nesquehoning Districts of the Lehigh Navigation Coal Co. Because of the consolidation of these two districts, railroad transportation of the coal to the central cleaning plant had become a major expense.

To reduce this expense, the heads of the company, W. Julian Parton, Joseph Crane, and James and Frank Fauzio, took what is considered the revolutionary step of utilizing small, powerful diesel-electric engines to haul the coal to the Lansford preparation plant.

Of the six units, three are 80-tonners producing 550 hp each, and are used to haul the coal a distance of four miles against heavy grades. The three 25-tonners rated at 150 hp each

are used for general colliery servicing. They are expected to offer a considerable saving in transportation costs over the old steamers. All six of the locomotives were delivered eight weeks after the order had been placed with G.E.'s Locomotive and Car Equipment Department, Erie, Pa. They entered service during the first quarter of 1955.

4000-Ton Uranium Mill

The proposed 4000-ton uranium mill for Consolidated Denison Mines—for which \$22,000,000 of mortgage bond financing has already been arranged—may give the company the largest single uranium treatment plant anywhere in the world.

Largest previous projected units for Canada were the 3000-ton twin units planned by Algom Uranium for its two mines. There is not believed to be any treatment unit in the United States or in the Western Hemisphere with a 4000-ton capacity.

Elsewhere, this side of the iron curtain, greater tonnages of uranium-bearing ores are probably being treated by gold mines in South Africa. But uranium content is much lower relatively and the uranium is only won as a by-product just as it is in the Belgian Congo.

Offshore Sulphur Dome

Humble Oil and Refining Co. told stockholders in its annual report for 1954 that its position for the future was "improved by good discoveries, the proving of a major sulphur deposit off the coast of Louisiana. . . ." This was the only discussion of the sulphur deposit, but its presence was indicated last year after Humble engineers, with the permission of the U. S. Department of Interior, began a series of core tests. The deposit is in offshore lands claimed by the Federal government.

Cannon Shaft In Use

The first iron ore was hoisted through the new Cannon mine shaft of the Hanna Iron Ore Co. in late March. Shaft sinking at the Cannon property, at Stambaugh, Mich., started August 22, 1951.

Ore now being hoisted is coming from the new seventh level at a depth of 1000 ft. The ore is raised in skips and dumped onto an apron feeder, which feeds a 30-in. belt conveyor; it in turn feeds a hopper. Ore from the hopper can be loaded into trucks for transportation to stockpile or loaded directly into railroad cars for shipment to the lake dock at Escanaba, Mich.

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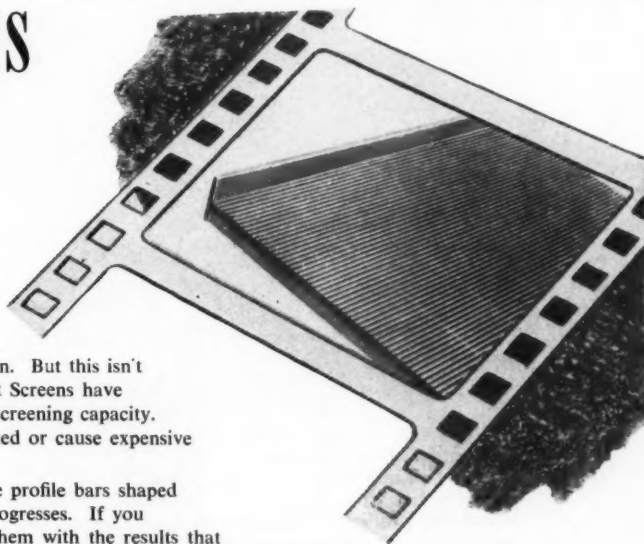


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Penn-Dixie Expands

Penn-Dixie Cement Corp. has purchased Federal Portland Cement Co., Buffalo, N. Y. Annual capacity of Federal is 1,800,000 bbl.

Hold Joint Meeting

Late in April the Lead Industries Association and the American Zinc Institute held a joint meeting in Chicago. For the former, it was the 27th Annual Meeting and for the latter, the 37th. Between 300 and 350 industry representatives attended. Some came from as far away as South America, Mexico and Canada. Among them were representatives of mining and refining companies and men from the major consuming industries.

First day of the three-day meeting was devoted to the lead industry exclusively. Second day was devoted to both metals and last day was concerned only with zinc. In the course of the meetings, members of the L.I.A. and A.Z.I. heard discussions and reports on old and new uses for the two metals, as well as analyses of the present and future outlook for the industry.

Names of the new officers in the two groups are given on page 85.

Shipping of Sulphur on Mississippi

A new method of shipping sulphur over long distance water routes—as a liquid instead of a solid—was inaugurated at Port Sulphur, La., May 4.

The first two of three new insulated barges each took on a 2500-ton cargo of melted sulphur at a temperature above the boiling point of water and began a tow up the Mississippi River to a plant 1100 miles and eight days away.

The sulphur was loaded at Freeport Sulphur Company's docks at Port Sulphur, 45 miles south of New Orleans. It will be used in National Lead Company's titanium division plant at St. Louis.

The three barges are insulated with four-in.-thick foam glass and are equipped with boilers and heating coils to maintain a minimum temperature of 260° F, 20° above the melting point of sulphur.

The sulphur is piped into the barges in the same liquid state in which it is mined, instead of being cooled and solidified and then shipped in solid chunks. Dust loss is prevented, moisture is avoided, contamination is reduced, and re-melting at the consumption point is eliminated.

Freeport began experiments in the

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transportation of liquid sulphur in 1948 between its Grande Ecaille mine and Port Sulphur, a distance of 10 miles. This early experience with a barge of 600-ton capacity indicated that the technique could be adapted to move larger quantities of sulphur over far longer routes.

When, in 1952 and 1953, the company developed two other mines, Bay Ste. Elaine and Garden Island Bay, in south Louisiana, a fleet of seven 1000-ton barges was built to deliver their entire output to Port Sulphur. The trip from Bay Ste. Elaine is through 75 miles of bayous and coastal canals; the trip from Garden Island Bay originates in one of the shallow, winding passes at the mouth of the Mississippi and proceeds 45 miles upstream.

In 1952 Coyle Lines became the first commercial carrier to transport liquid sulphur when it put into service a 1000-ton barge operating between the Moss Bluff mine of Texas Gulf Sulphur Co. and a sulphur consuming plant about 50 miles away. The Freeport-National Lead haul represents the first shipping of liquid sulphur in large quantity over long distance water routes. The three barges will form an integrated tow capable of carrying 7500 tons of the molten mineral.

Wheels of Government

(Continued from page 84)

gram for each of the minerals now being bought.

The Engle bill provides that "in case of manganese delivered to purchase depots not more than eighteen million recoverable units shall be bought at any one depot." Present goals are six million units for each depot. It also calls for the establishment of two additional depots with locations to be determined by the Office of Defense Mobilization—one to serve the Ozark-Cushman area and the other to take care of the Appalachian area.

The House measure would limit the new goals, other than manganese, to double the amounts presently authorized to be purchased and would direct ODM to use funds already appropriated for the buying programs.

It is expected that the House Interior Committee will report the measure to the House shortly. Administration officials have privately expressed the view that this bill would meet with their approval.

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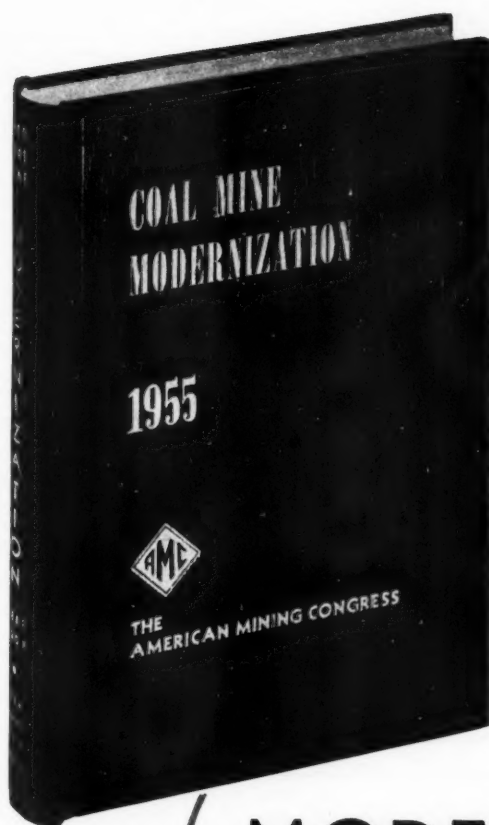
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Western States

Nevada Tungsten Strike

A rich tungsten strike has been reported near the Nevada Scheelite Mine at Rawhide, Nev. The orebody is reported to be at least seven ft wide and to contain an estimated 100,000 tons.

Confirm Idaho Uranium Find

The Idaho Bureau of Mines and Geology has confirmed the discovery of uranium in Lemhi County of eastern Idaho.

Dr. J. D. Forrester, director of the bureau, said the recent discoveries were made in the Challis volcanic formation seven miles south of Salmon City. One occurrence of uranium was found in a road cut on U. S. Highway 93, south of Salmon City and another was located along Williams Creek near the Salmon River.

Considerable claim staking has accompanied the discovery and the town of Salmon is experiencing a boom similar to gold rush days.

Westvaco Leases Property

A large deposit of barite near Battle Mountain, Nev., has been leased by Westvaco Mineral Products Division of the Food Machinery & Chemical Corp. The barite property was leased from the Glidden Co. of Cleveland and will be operated in conjunction with other Westvaco properties, according to W. N. Williams, division president. Arrangements for the transaction were made through the Westvaco Mineral Development Department, Pocatello, Idaho, under direction of O. A. Power.

Awards for Loyal Service

Awards in recognition of 20 and 30 years of loyal service were presented to 106 employees of Kennecott Copper Corporation's Utah Copper Division at special banquets April 6 and 7. Veteran employees and their guests attended the two banquets held at the Newhouse Hotel in Salt Lake City.

On April 6, 81 employees were presented engraved, gold wrist watches for 30 years of service with Kennecott Copper. The awards were presented by L. F. Pett, division general manager,

and Leland B. Flint, Kennecott director. J. P. Caulfield, general manager of the Western Mining Divisions, acted as toastmaster.

April 7, 25 employees received a certificate of service and a gold lapel pin for 20 years of service. These awards were presented by Mr. Flint and Mr. Caulfield. F. C. Green, assistant general manager of the Utah Copper Division, acted as toastmaster.

Annual service award banquets have been held by Kennecott Copper since 1926. There are 998 former and present recipients of service awards employed by the company. All are special guests at the annual award banquets. A total of 566 have received 30-year awards and 432, 20-year awards.

Bell for San Manuel

Hewitt-Robins Incorporated has been awarded a contract to supply two miles of conveyor belting and machinery components for the new San Manuel Copper Co. mine in Tiger, Ariz., which will be the third largest copper mine in the United States when it goes into operation in 1956. The conveyors will carry copper ore from the storage area outside the mine through the mill where it is processed.

The San Manuel mine is one of 11 new sources for copper currently being developed in Arizona, Nevada, Montana and Michigan. Production at San Manuel is expected to run around 70,000 tons of copper a year.

To Develop Midnite Uranium

Newmont Mining Corp. has taken over the development of the Midnite Uranium property on the Spokane Indian Reservation in Washington.

Provided sufficient ore reserves are developed, Newmont will construct a uranium processing plant near Spokane. A new corporation, the New Co., has been formed for the purpose of exploiting, developing, producing and milling the known uranium deposits on Midnite holdings.

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Wyoming Geological Map

Secretary of the Interior Douglas McKay has announced the publication of a new geological map of Wyoming by the U. S. Geological Survey. The map was prepared in cooperation with the Wyoming Geological Survey and the University of Wyoming. Copies are available for \$2.50 from U. S. Geological Survey, Distribution Section, Denver Federal Center, Denver, Colo.

Kaiser Options Coal Co.

Kaiser Steel Corp. has been granted an option by stockholders of the St. Louis, Rocky Mountain & Pacific Co. to purchase all that firm's real estate and mining facilities in Raton, N. M. Included are 202,000 acres of land in fee simple and about 326,000 acres of coal rights. For the sale to become final, Kaiser must exercise the option by August 1.

No price was announced, nor was it revealed what Kaiser's plans are for the area. Rocky Mountain will conclude its operations in northeastern New Mexico if the sale does go through.

New Source of Sodium Sulphate

West End Chemical Co. will start producing salt cake and anhydrous sodium sulphate in mid-summer 1955 from the natural brine deposits at Searles Lake, Calif. The brine will be processed by special equipment now under construction. Initial production will be at the rate of 50,000 tons annually.

Utah Prison Land Exploration

Terms of a lease have been agreed upon under which the American Smelting & Refining Co. may prospect for and develop possible mineral deposits on property of the Utah State Prison. The terms were negotiated by the State Land Board in cooperation with the State Board of Corrections and the State Road Commission. The Road Commission holds title to a wide strip of land through the prison area. It was announced that 1097 acres of State prison land are involved in the lease.

A.S.&R. has agreed to pay the State an annual fee, plus a royalty to be fixed on a sliding scale on any minerals extracted. Tests made by the company have disclosed three magnetic highs on the prison property, indicating possible presence of mineralization.

Exploratory drilling is to start in May and will penetrate a thick layer of gravel overlying bedrock. The lease permits the company to extract copper, lead, zinc, gold, silver, molybdenum, iron and other types of metallic ores, but not fissionable materials.

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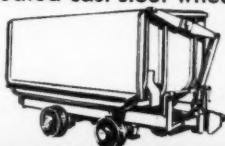


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Over 15 years ago, the Anaconda Copper Mining Co. came to Card seeking the engineering of a side dump ore car that could serve a wide scattering of mine properties in Montana. Design requirements submitted by Anaconda called for long life in underground heavy-duty haulage and highly corrosive conditions.

About 1200 Card Granby-type cars are now in service in Anaconda's Montana operations. The latest designs differ in minor aspects from the original order, but all have proved highly satisfactory. The 115 cu. ft. car on 36" gauge has a high capacity to length ratio, keeping trains short. For maximum capacity, doors and back are internally braced. To ease loading shocks, the trucks are coil spring mounted, and the use of Card heat treated cast steel wheels with Timken bearings assure extended

wheel life and easy haulage. Card engineers are happy to consult on any haulage problem. No obligation.



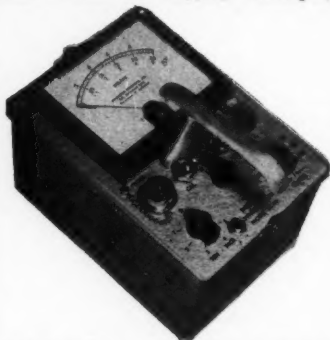
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Washington Copper

Earle B. Gibbs has taken over operation of the Chewelah Copper Co.'s properties east of Chewelah, Wash. Chewelah Copper for several years has been consolidating and rehabilitating properties at the old Eagle Mountain copper camp, including the United Copper and Amazon mines.

Gibbs is taking the operations over on a profit-sharing agreement. Ore will be trucked to the Bonanza mill north of Colville, Wash., for the time being, but plans call for installing a crusher, a sink-float plant and other milling machinery at Eagle mountain.

Increase Reserves

Consolidated Coppermines Corp. reportedly has increased its Ely, Nev., ore reserves to between three and four times the amount extracted last year. A. J. O'Connor, vice-president and general manager, said the big increase was due to intensive drilling in the fringe areas of the Ely property.

O'Connor estimated the reserves added by fringe drilling at 11,900,000 tons. But he pointed out that mining of part of it—due to its grade—will be possible only if the market is favorable.

Crescent Orebody

Silver-copper ore has been encountered on the new 3200-ft level in the Crescent mine, east of Kellogg, according to John D. Bradley, president of Bunker Hill & Sullivan Mining & Concentrating Co. Bradley reported the ore bearing structure is between four and five ft wide with a grade better than that mined on upper levels before the mine was shut down during World War II. The mine has been rehabilitated and deepened within the last two years.

The Crescent shaft was extended to the 3200-ft level and the current lateral exploration work was undertaken under a contract with the Defense Minerals Exploration Administration.

To Build Uranium Mill

Signing of a contract on April 28, covering the construction and operation of a uranium ore processing mill at Edgemont, S. D., was announced by the Grand Junction Operations Office of the U. S. AEC. Construction of the plant is expected to begin promptly, with completion scheduled in about 10 months.

The new mill, to be owned and operated by Mines Development, Inc., of Denver, Colo., will provide processing facilities for the uranium ores of the Black Hills region, including current ore production which is being stockpiled at the government owned ore-buying station at Edgemont.

Mines Development, Inc. is one of

several private firms which had submitted proposals to the Commission for a mill in the Black Hills area. When the Edgemont mill is completed, it will bring to 10 the number of uranium processing mills operating in the western United States.

Colorado Sulphuric Acid Plant

Sulphuric acid will be produced in a Rico Argentine Mining Co. plant which is now under construction at Rico, Colo. The plant will cost \$1,500,000.

Present plans call for initial production of 150 tons per day and will be marketed to uranium mills within a 100-mile radius of Rico. Construction of the plant will be completed in August.

Add to Cobalt Plant

In its annual report to stockholders, Howe Sound Co. announced that two reduction autoclaves were placed in operation at the company's cobalt refinery at Garfield, Utah, on February 3. An additional oxidation autoclave was expected to be in operation by April 1. The company reported that this equipment, together with a third reduction autoclave still on order, should make possible a material expansion in production.

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Small Idaho Mill

Idaho Goldfields, Inc. has announced plans for installation of milling facilities at its Fourth of July property between Kellogg and Coeur d'Alene.

The plant will have a capacity of 15 tpd and will handle oxidized development ore from surface mining operations.

Use Hot Spring Water

Superheated water from an underground well is a major factor in the treatment of manganese ore by the Nevada Refining Corp. The plant, located near Reno, Nev., is using a new chemical process to treat ore in producing manganese sulphate. Use of the underground hot springs solves a major problem in the new process since tremendous quantities of very hot water are needed. The 300-ft well provides water at temperatures to 450°. The plant is processing 20 tpd of ore hauled from mines near Quincy, Calif.

Vitro Outlook

J. Carlton Ward, Jr., president of Vitro Corporation of America, recently told shareholders that prospects for the corporation were improved as compared with the first quarter outlook a year ago.

Ward reported that the newly organized subsidiary, Vitro Minerals Corp., is now actively mining uranium in the Gas Hills area of Wyoming and is currently delivering ore to the Atomic Energy Commission. Active exploration is going on in both the United States and Canada. Enlargement of the Salt Lake City uranium mill has been completed and it is now showing satisfactory operating results, he indicated.

Anaconda Considers Open Pit

In addition to regular underground and Kelley mine operations, about 2000 tpd of low grade copper ore was mined last year by Anaconda Copper Mining Co., Butte, Mont., from the new Skyrme Pit, according to the company's annual report. A comprehensive exploration and development program is now under way to test the feasibility of increasing copper production at Butte by large-scale strip mining methods. The area involved, an extensive low-grade ore zone near the surface, is southeast of the Greater Butte Project's main Kelley mine ore zones. Sufficient work has been completed to indicate a potential open pit ore reserve of approximately 100,000,000 tons.

The company plans to start stripping overburden at the southeast end of the new orebody in preparation for an experimental pit project. Purpose of the experiment is to check drill hole assays, metallurgical treatment meth-

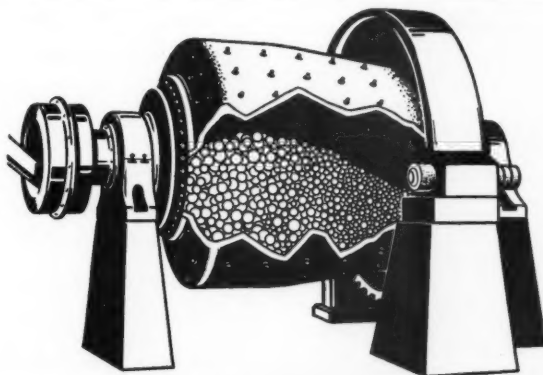
ods, and other factors affecting the possibility of large-scale open pit operation in the Butte District.

Anaconda's report revealed that production from the Kelley mine averaged slightly in excess of 12,000 tons of ore per day over a period of approximately 10½ months last year and the objective of 15,000 tons per day is expected to be reached in the current quarter.

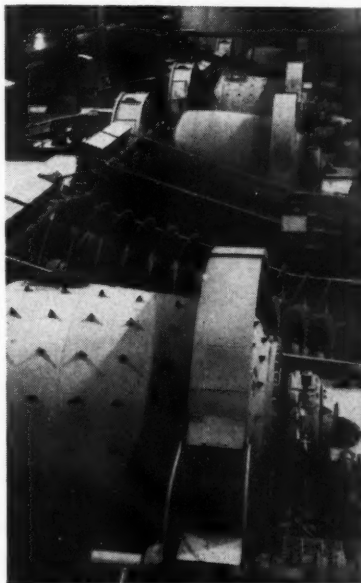
The company's aluminum metal producing plant at Columbia Falls, Mont., is expected to start producing by mid-1955, the report said, and the installation of additional units to the

potlines will increase capacity to 60,000 tons a year against 52,000 tons as originally planned.

Concerning the company's uranium development activity, the report quotes an Atomic Energy Commission summary as stating that at Anaconda's Jackpile mine east of Grants, N. M., ore reserves have reached several million tons. Detailed information is classified, but the company has been authorized to report it has developed large deposits of uranium ore on Indian lands held under lease agreements with the Laguna Tribal council.



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Mi Vida Film Ready

Charles A. Steen, president of Utex Exploration Company, Moab, Utah, has announced that the company's film entitled "Mi Vida" is now ready for distribution to engineering and geology departments of colleges and universities, and to scientific clubs, banks, service clubs, and other groups interested in uranium production.

The film, a 16 mm documentary, presents a rather complete story of the operation of the Mi Vida mine discovered by Mr. Steen in July 1952.

The picture had its premiere showing in Salt Lake City recently at the Institute on Uranium and Mining Problems sponsored by the Utah State Bar Association and University of Utah College of Law. The film, about 45 minutes long, will be furnished free of charge with the understanding that it will be shown on a good 16 mm sound projector, preferably a Bell and Howell or its equivalent. Three probable dates for showing should be submitted in the request to Utex Exploration Co. at Moab, Utah.

Silica Properly Purchased

Nunn Co., a silica mining and processing firm near Overton, Nev., has been purchased by the J. R. Simplot Co. Operations will be taken over by the Simplot Silica Products, Inc., a newly-formed Nevada corporation. The operation has a plant capacity of 100,000 tons per month.

Idaho Safety Awards

Bunker Hill & Sullivan Mining & Concentrating Co. of Kellogg, Idaho, has won the 1954 Idaho Safety award for large mines. Most improved in the large mine class was Sunshine Mining Co. of Kellogg.

For the second year, Clayton Silver Mining Co. of Clayton, Idaho, received the safety award for mines with less than 250,000 man-hours. Most improved in this class was Sidney Mining Co., Kellogg.

Certificates of improvement have been issued to the Ima Mine of the Bradley Mining Co.; the Morning Mine of the American Smelting & Refining Co.; the Polaris Mine of the Hecla Mining Co.; the Dayrock and Hercules Mines of the Day Mining Co.; and the Spokane-Idaho Mining Co.

Anthracite Recovery

(Continued from page 38)

for cleaning out the diaphragm pumps, conditioner, etc.

Water Conservation

All efforts have been directed toward the conservation of water in the event that extremely dry spells might reduce the primary supply of water underground. A splendid example of this care is the arrangement whereby part of the overflow of the 26-ft hydroseparator can be diverted from the overflow launder and returned to the main feed pump. Cyclone effluent can be diverted from the refuse flume and recirculated to the flotation feed sump and the overflow of both the flotation feed sump and hydroseparator feed sump can be returned to the plant feed sump if needed.

In addition, surfaces under the loading tracks have been graded and paved to return drainage from the loaded cars to the plant feed sump. Two-in. pipes with firehose connections have been provided to wash down these areas and recover the solids.

Engineering construction work was done by Wilmot Engineering Co. after collaborating on the flowsheet with E. M. Robinson and J. J. Halpin, superintendent of preparation and mechanical engineer, respectively of Jeddo-Highland and the late W. T. Turball, consultant.



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Develop Metropolitan

Sunshine Mining Co. is scheduled to resume deep-level development of Metropolitan Mines Corp. property at Wallace, Idaho, under an operating agreement between the two companies.

Plans are to extend the 3700 level westerly on the Yankee Girl vein with the objective of getting underneath the ore zone opened on the upper levels of Metropolitan ground. Sunshine also plans to resume work on the 3400-ft level in the Metropolitan area as soon as arrangements can be made to dispose of waste rock. This drift will open an area beneath a stope which yielded considerable rich silver ore above the 3100-ft level.

Awarded Verdi Contract

MacAfee & Co., Los Angeles consulting engineers, has been awarded the contract for process engineering, plant design and construction of the new mill for Verdi Development Co., Uranium Division.

This will be the first chemical uranium leaching plant in California and will be located at Soledad Mountain, near the company's Rosamond area uranium mines.

MacAfee & Co. will also direct the exploration and mining operations of the company.

Dredge Being Moved

A 300-ton floating dredge, used to work the gold placers in the Helena, Mont., area, is being dismantled and will be hauled to new placer workings in the Boise Basin in Idaho. The dredge belongs to Porter Bros. Corp. which used it first in the Helena area in 1935. It has been shut down five years.

Porter Bros. Corp. recently negotiated a long-term contract with the Government for the production of monazite sands from their Idaho properties.

Withdraw Public Lands

An order withdrawing approximately 8600 acres of public land in the Tonto National Forest, Ariz., from application of the mining laws, in order to safeguard watershed conservation and management programs, was issued May 2, according to Secretary of the Interior Douglas McKay.

One effect of the order is to ban prospecting in the Sierra Ancha Experimental Forest where for many years the Forest Service, Department of Agriculture, has conducted extensive studies of stream flow, water yield, erosion and other aspects of watershed management. Results of these studies have found practical application in many parts of the Southwest, Secretary McKay said.

The Forest Service requested withdrawal of the experimental forest lands in November 1951, but the application encountered strong opposition because evidence of the existence of uranium in the Tonto National Forest had been discovered. Originally, the application requested withdrawal of 13,000 acres.

Public hearings which started in Globe, Ariz., last fall and subsequent interagency studies established that about 4400 acres out of the 13,000 acres listed in the original application, could remain open to mining prospecting and development without materially interfering with the work under way in the Sierra Ancha Experimental Forest.

The Forest Service, after reexamining its program for the area, amended its application to ask for the withdrawal of 8600 acres from mining location.

Serious consideration was given to the possible effect of the withdrawal upon the national need for uranium, Secretary McKay said. With the elimination of 4400 acres of the more important uranium area from the withdrawal, the Forest Service could continue its experimental work and at the same time uranium mining would not be appreciably curtailed, McKay said.

New Nevada Mercury Kiln

United Uranium and Oil Corp. announced that it has placed an order for a 100-ton kiln to operate at its new McCoy Mine, an open pit operation, near Battle Mountain, Nev. The kiln will provide the company with a capacity of 220 flasks per month.

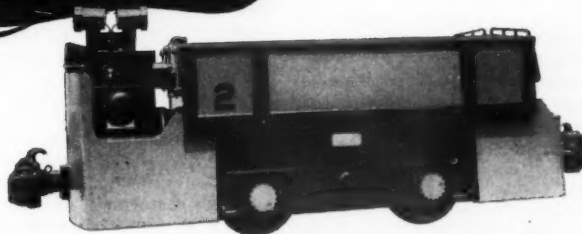
U&I Merges With Federal

U and I Uranium, Inc., of Kellogg, Idaho, has announced that it will merge its Radon and Hotrock properties in the Big Indian District of San Juan County, Utah, with Federal Uranium Corp. of Nevada. According to the report issued by a special shareholders committee, the merger will be on the basis of one share of Federal for each 12½ shares of U & I. Other assets of U & I, consisting of the Rocket group in Grand County, and other holdings in the State of Utah, will be retained and placed in another corporation.

Merged into Federal Uranium Corp. of Nevada were Federal Uranium Corp. of Utah, Utida Uranium, Inc., Interstate Uranium, Western States Uranium, Howell Mining Co., Kentucky-Utah Mining Co., Santa Fe Uranium Co., U & I Uranium Corp., Fourteen Group Inc., and Uranium Prospectors, Inc.

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—BOOK REVIEWS—

HOW TO KNOW THE MINERALS AND ROCKS by Richard M. Pearl. Published by the McGraw-Hill Book Co. 192 pages. Price \$3.50.

RICHARD M. PEARL is assistant professor of geology at Colorado College, Colorado Springs, Colo. He is active in a number of mineralogical and gemological societies and the author of "Popular Gemology," Mineral Collectors Handbook and others.

His present book is a practical, basic field guide to more than 125 of the most important minerals and rocks, including gems, ores, native metals, meteorites and other interesting minerals. Written for the beginner and amateur collector, it features basic, step-by-step methods by which any collector can quickly and easily identify typical specimens and some of the more rare and unusual ones as well.

Once he masters Mr. Pearl's Four Keys to Recognizing Rocks, and Seven Keys to Recognizing Minerals, the collector can identify the distinctive properties of each mineral or rock with very little equipment and no special skill. Arranged in handy form with one page devoted to each mineral or rock, the book is profusely illustrated with drawings and color photographs.

Authoritative and up to date, this book will be an important tool for the collector, at home or in the field, and an excellent handbook for the mining man whose mineralogy has gotten a little rusty with the years.

THE URANIUM PROSPECTOR'S GUIDE. By Thomas J. Ballard and Quentin E. Conklin, Harper & Brothers Publishers, 49 East 33rd St., New York 16, N. Y. 251 pages, illustrated. Price \$3.50.

AUTHORS Ballard and Conklin were formerly Staff Mining Engineer and Deputy Director, respectively, of the Exploration Division, Grand Junction Operations Office, AEC. They are now Mining Engineers, Uranium Prospectors Co., Ltd., Grand Junction, Colo.

According to the foreword, "This book is designed to convey in non-technical language the basic information necessary to the prospector, miner, or layman who is interested in uranium raw materials."

Under the heading *Opportunities in Uranium*, the authors have this to say. "Every mining region has its quota of those fortunate individuals who 'strike it rich.' Uranium is no exception and the list of important discoveries is growing larger."

Further along they sound this timely note of warning. "The odds, however, are against the average pros-

pector's finding a good deposit. Sensational discoveries make the headlines, but the failures are seldom publicized."

With their feet on such firm ground, Ballard and Conklin proceed to do just what they promised to do in the foreword. They draw heavily on many separate published sources of authoritative information and add to it from their own considerable fund of experience. The result is a timely, useful, understandable book on prospecting for uranium.

PRINCIPLES OF NEW PLANT DESIGN FOR HEALTH PROTECTION, by Theodore Hatch. Industrial Hygiene Foundation, Mellon Institute, 4400 Fifth Ave., Pittsburgh 13, Pa.

As the title implies, this recently released booklet has to do with the application of industrial hygiene to plant design. It deals with the design of a new plant by the Mutual Chemical Co. of America, Baltimore, Md., involving the processing of material having toxic properties. It was the objective of the company to design and construct its processing plant in such a way as to minimize to the highest degree the opportunity for the toxic material to escape into the working atmosphere. The booklet can be obtained without cost upon application to the Mellon Institute.

CONVEYORS AND RELATED EQUIPMENT. Third Edition. By Wilbur G. Hudson, John Wiley & Sons, Inc., New York, 524 pages. Price: \$9.00.

IMPROVEMENTS in the construction of conveyor belts during the last 10 years are included in this recently published book which also gives the current outlook on the saving of time, storage space and labor cost. New material deals with modern belt construction and dynamic drive control, today's costs and designs of silos, bins and bunkers, developments in boiler house coal handling and storage, dust explosion hazards, the hydraulic transportation of coal in pipelines, and the role of the two-way radio in expanding the applications of motorized industrial trucks. After a pertinent historical outline, the author goes into the technicalities of layout, maintenance suggestions, and performance possibilities, including the application and limitations of each machine. Among the machines covered are screw, flight, and apron conveyors, the bucket elevator, the skip hoist, aerial tramways, crushers, hammermills, pulverizers, and others.

MINERALS IN WORLD INDUSTRY by Walter H. Voskuil. McGraw-Hill Book Co., Inc., 324 pp., price \$5.75.

PROF. WALTER H. VOSKUIL is chief mineral economist, Illinois State Geological Survey and professor of mineral economics, College of Engineering, University of Illinois. He is an outstanding authority on his subject and skillful in the use of statistics and historical background to lead the reader to an appreciation of modern products and practices.

This book is concerned primarily with the part played by minerals in economic productivity, and in the establishment and maintenance of a high standard of living.

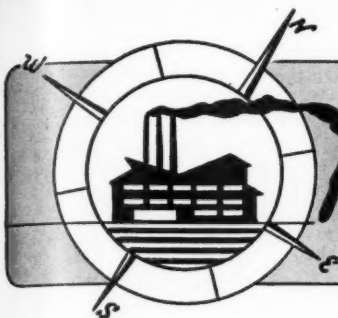
The author defines mineral economics as the study of the part played by minerals in economic productivity. He points out that minerals extend the versatility of a man's hand and multiply the power of his muscles. As mechanical hands, machines shape, move and manipulate the vast tonnage of materials necessary to produce easily and abundantly goods which man could produce only with great labor if he had to work just with his hands or primitive tools.

Our modern productive economy, he states, uses about 100 minerals in large or small amounts to do the things that man wants done. Beginning with a study of iron as the core of our productive society based on minerals, he goes on to consider fuels—coal, petroleum, natural gas and "alternative fuels." The distinctive use of each metal and mineral is described and its relationship to iron as the basic material is discussed.

The book also deals with the international political aspects of mineral resources. Their unequal distribution throughout, what must for present purposes be considered a two-power world is discussed. The problems of the United States in its quest for the minerals needed to maintain our high standard of living and raise standards throughout the rest of the Western World is one of the primary concerns of this interesting book.

THE ORANGE FREE STATE GOLD MINES by Paul Klempner. Second edition. 127 pages. P. Klempner, 20 Mowbrey Rd., South Shields, County Durham, England. Price 21 shillings.

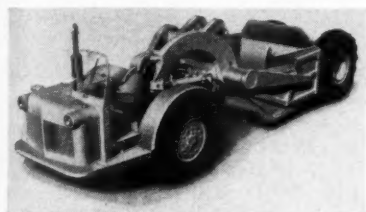
In the foreword to this book, Mr. Klempner points out that he has attempted to furnish information concerning Orange Free State Gold Mines (South Africa) with a view to giving a fair assessment of the potential possibilities of each mine in the OFS from an investor's point of view. In this new edition of his work the author not only presents his forecasts and recommendations but also shows in detail how he reached these conclusions.



Manufacturers Forum

New 7-yd Scraper

The latest addition to Euclid's line of motor scrapers, the Model S-7 is the first of its overhung engine scraper to go into production. It is



powered by a 143-hp diesel with a five-speed transmission. All of the scraper operations, bowl, apron and ejector, are controlled by hydraulic lever action.

Catalog literature and complete specifications of the S-7 Scraper are available from the Euclid Division at Cleveland 17, Ohio.

Blasthole Drill

The new Triple Duty Drillmaster of the Ingersoll-Rand Co. is a self-contained drilling unit designed to speed up the drilling of rock and provide a wider range of hole sizes and drilling depths. The manufacturer says the drill embodies three combinations or methods of drilling.

In one it utilizes an air drill which travels down the blasthole with the

drilling bit. Air is furnished the drill from the surface through hollow drill steel. Designed for deep blastholes up to six-in. in diameter, this method overcomes the problem of having to rotate long lengths of drill steel.

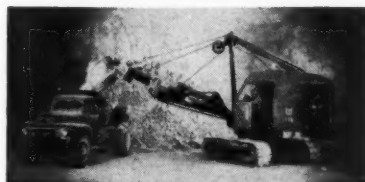
In combination two, the drill is available with a heavy-duty hammer drill for 4 1/4-in. holes.

Combination three allows for rotary drilling of holes up to six and a quarter in. in diameter. The user can have any one or all three of the drilling combinations to suit his own requirements or rock conditions.

Additional information can be obtained from Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. Request Form 4164.

Loader Attachment

A new loading attachment is now available for underground mining and general bulk materials handling.



Called the Excaloder, it adapts the new Link-Belt Speeder heavy-duty one-yard LS-98 shovel-crane for horizontal, straight-line loading operations.

The Excaloder is an attachment that is interchangeable with the shovel, hoe, dragline, clamshell or crane attachments for the LS-98. It features low overhead clearance—standard mast requires only 15 ft, 10 in. clearance height. An optional low mast has minimum clearance height of only 11 ft, 3 in. Maximum dumping height, with stick extended at 45°, is 16 ft, 11 in. and with stick retracted at 45°, is 11 ft, 4 in.

One advantage of the Excaloder is said to be its employment of straight-line bucket action. This motion, during crowding or retracting, makes the grading and clean-up or loading from stock piles simpler.

Complete information is available from Link-Belt Speeder Corp., Cedar Rapids, Iowa.

For Heavy Going

Truck tracks have been introduced by the P & G Supply Co. to the mining industry. The tracks give up to 500 percent greater flotation and are quickly and easily adjusted to various



size tires and road conditions according to the company. They are for use by open pit and strip miners facing wet or snowy conditions. P & G supplies a standard 15-in. track for single and tandem axle and also has available a heavy duty 18-in. track for many larger size tires. Full information is available from the P & G Supply Co., 2262 N. Albina St., Portland 12, Ore.

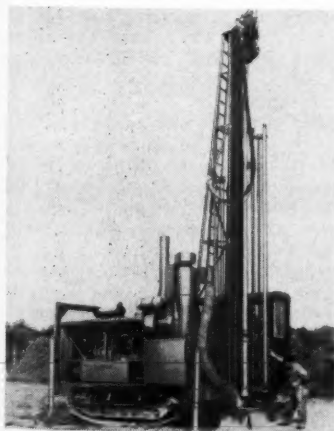
New Ball Bearing Unit

A two bolt flange ball bearing unit is being marketed by the Sealmaster Division of Stephens-Adamson Mfg. Co., Aurora, Ill. Interchangeable with the Sealmaster four bolt flange units



on the diagonal bolt hole dimension, this new bearing is available in shaft sizes from 1/2 to 2 3/16 in. The two bolt flange unit retains all Sealmaster patented design features.

On new installations the two bolt flange bearing eliminates two fasteners as well as the punching or drilling

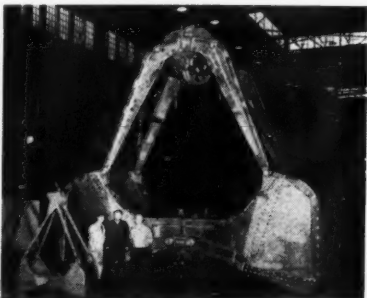


operation for two mounting holes. In addition, it is said to cut installation costs and allow for closer bearing spacing on multiple shaft installations. As a replacement bearing, the new unit fits the diagonal bolt centers on present four bolt base flange units and carries the same load rating for a given shaft size.

For further information on the Seal-master two bolt flange ball bearing unit, write for bulletin SS-125.

Big Bucket

The clamshell bucket pictured below will lift enough coal in one bite to heat a seven-room house in a northern climate for more than two years. It moves 680 cu ft at a time with ease. Shipped recently from Pittsburgh al-



ready assembled by the Blaw-Knox Co., Pittsburgh industrial manufacturers, the bucket made a full load for a center well railroad car.

The four-rope, geared hinge, corner bar type clamshell is the largest of more than 400 varieties of buckets produced by Blaw-Knox that can be shipped completely assembled.

The bucket weighs 32,000 lb and lifts another 34,000 lb to give it a gross weight of 33 tons when loaded. Despite its size, there is considerable precision work on the bucket.

In the left foreground is a three-eighths-yd, two-line bucket.

Strong Belt

A new conveyor belt reported to be much stronger than conventional cotton reinforced belts has been developed by Hewitt-Robins Incorporated to transport coal, ore, crushed stone and other bulk materials over long distances and up steep grades.

The belt, reinforced with a new synthetic fabric called Super Raynile, is pliable and flexible. It is less expensive than steel-reinforced belts, according to the manufacturer who adds that it can be spliced quickly in the field without special equipment.

The new belt will be manufactured in various widths up to 72 in. and in thicknesses ranging up to 15 plies. The first installation will be made in the National Gypsum mine at Shoals, Ind., where gypsum will be hauled up an underground slope 2065 ft long and rising 610 ft.

New Insulation for Large Motors and Generators

Allis-Chalmers Mfg. Co., General Machinery Div., Milwaukee 1, Wis., has announced the first all-silicone-rubber insulating system for large motors and generators. Known as the *Silco-Flex* system, it is immediately available for all Class H insulated form wound coils and for Class A and B windings operating under certain service conditions.

Using as its basic material Dow-Corning's *Silastic* silicone rubber, *Silco-Flex* insulation is said to possess outstanding thermal endurance and moisture resistance, with the flexibility and resilience formerly obtainable only in organic rubber.

Accident Prevention Signs

Self-Sticking Accident Prevention Signs are now sold and stocked by the W. H. Brady Co., manufacturers of self-sticking industrial products.

The signs include both basic purpose signs (example: "Danger") and specific purpose signs (example: "No Smoking"). Either type sign can be used alone or in combination with other signs.

Signs are made of impregnated cotton cloth with a temperature-resistant pressure-sensitive adhesive. Unskilled personnel can apply Brady Signs without tools, screws, nails or bolts.

Write for new 16-page, full color Brady self-sticking accident prevention sign bulletin 145-C and free usable samples. Address: W. H. Brady Co., 727 W. Glendale Ave., Milwaukee 12, Wis.

Drilling Rig

Gardner-Denver Co. announces the new Air Trac (R), self-propelled drill carrier with crawler-type tracks. Where it has been used on steep terrain and on drilling sites that are un-



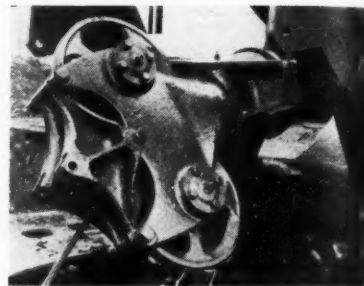
usually rough and rocky, the Air Trac has proved its value. The unit consists of a hydraulically actuated T-bar mounted on two self-propelled crawler treads each powered by a Gardner-Denver air motor. Traction power developed is sufficient to haul an 11,720 lb compressor up a 10 percent grade. The T-bar supports a

Gardner-Denver chain feed and rock drill.

Full details may be obtained from Gardner-Denver Co., Quincy, Ill.

Rotating Fairlead

A new, full rotating type fairlead for use on Bucyrus-Erie 22-B $\frac{3}{4}$ -cu yd draglines is now available. Standard equipment on present 22-B models, this fairlead—with suitable bracket and anchor pin—can also be used to



replace the old style swinging, or hinge type, fairlead on all 22-B draglines in the field.

The unit is designed to lengthen drag rope life and lessen maintenance expense for fairlead guide plates and sheaves. The rotating fairlead instantly assumes the plane in which the rope bends over the sheave.

Guide sheave or rollers are not required. Contact of the rope with the guide plates causes it to rotate into line of rope pull and chafing of the rope on the guide plates is said to be negligible. The guide plates are reversible to give double wearing life.

For further information, please write Bucyrus-Erie Co., South Milwaukee, Wis.

High Power Radio

Development of a standard superpower two-way radio unit for extended communication range has been announced by the General Electric Co.

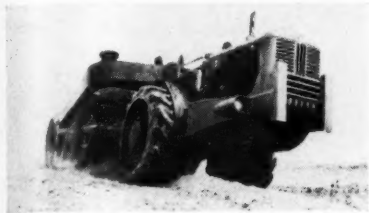
The new radio, an addition to GE's recently announced Progress Line of radio communication equipment, is capable of transmitting up to a 110-watt signal. Previously, the highest power standard mobile radio was capable of transmitting only a 60-watt signal.

The new two-way radio unit operates in the 25 to 50-megacycle band and is expected to be useful for organizations such as power utilities, construction, mining, highway maintenance and industrial concerns which need higher transmitting power for mobile to mobile and mobile to base station communication over great distances. The radio may be mounted either under the dashboard or in the trunk. It can also be switched between vehicles having either 6 or 12-v-d-c systems without electrical alterations.

Big Earthmovers

The new International 75 Payscraper is now being introduced by the International Harvester Co.

Largest high-speed, rubber-tired earthmover in the International line, the Payscraper is designed for big earthmoving jobs—for stripping over-



burden in big mining operations, making cuts and fills in big highway and construction projects. It has a 262-hp diesel engine and can scoop up an 18-cu yd heaped load, and travel at more than 24 mph.

The tractor has five forward transmission speeds and one reverse speed, ranging from 2.77 to 24.75 mph. Included in the electrical system are two 12-v batteries, a 24-v, 20-amp generator, a 24-v push-button starter and 12-v, sealed beam headlights with resistors. The weight of the entire unit is 52,000 lb.

Standard Drill Rods

E. J. Longyear Co. of Minneapolis recently announced a complete line of drill rods developed to the new standards adopted by the Diamond Core Drill Manufacturers Association and the Canadian Diamond Drilling Association. Known as the "W" series, these rods will come in EW, AW, BW, and NW sizes. These new standards have been recommended for world-wide acceptance.

The new "W" series rods in all sizes are now available for immediate delivery. Specifications of "W" drill rods and couplings can be obtained by writing to E. J. Longyear Co., Foschay Tower, Minneapolis 2, Minn.

Power Wheelbarrow

A new Prime-Mover powered wheelbarrow has just been introduced by the Prime-Mover Co., Muscatine, Iowa. The new unit hauls $\frac{3}{4}$ ton—10 cu ft (liquid level), 16 cu ft heaped—on a chassis 64 in. long and



31½ in. wide. The unit is engineered for use on the same type ramps, runways, hoists and towers normally used for hand carts, and is equipped with positive controls that are said to allow the most inexperienced laborer to operate the unit safely and efficiently.

Another important feature, according to the manufacturer, is the quick method of changeover from dump bucket to flatbed. A thoroughly proven engine and forward and reverse transmission guarantee dependable performance. A recoil starter, extra large fuel tank, sealed-in lubrication, and a one-piece engine hood minimize and simplify maintenance.

Although designed for placing concrete, this powered wheelbarrow might well be used in a small mine operation.

Announcements

John L. Phillips, Jr. has been named district manager of Mining Sales in the Beckley, W. Va., territory, for The Jeffrey Mfg. Co., Columbus, Ohio. He succeeds E. H. Hebden who has returned to Columbus to assume the duties of manager of Mining Renewal Parts Sales, according to an announce-



J. L. Phillips, Jr.



E. H. Hebden

ment made by A. R. Anderson, general manager of Mining Sales.

Phillips, formerly assistant manager of Mining Apparatus Sales in the Jeffrey home office, has been with the company since 1948. Hebden joined Jeffrey in 1936 after extensive experience in all phases of coal mine operation. He had been Beckley district manager since 1947.

Appointment of H. T. "Herb" Anderson as sales engineer in the Pacific Coast Territory is announced by R. W. Bayerlein, vice-president, Heavy Machinery Division, Nordberg Manufacturing Co., Milwaukee 1, Wis. Anderson will assist C. G. Cox, Pacific Coast District Manager, and serve the states of California, Oregon, Washington, Idaho, Nevada, Utah and Arizona.

H. H. Buckley has been appointed sales representative for the Goyne Pump Co., Ashland, Pa. His territory will include the bituminous coal fields of Pennsylvania, the northern half of West Virginia, and all of Ohio.

Edward H. D. Gibbs has been appointed vice-president in Charge of Sales of Heyl & Patterson, Inc., Pittsburgh, manufacturers of Heavy Bulk Materials Handling Equipment.



Gibbs joined Heyl & Patterson in 1948 as a contracting engineer, serving in that capacity until he became sales manager in 1954. Prior to joining Heyl & Patterson, he had worked for United States Steel Corp. in various engineering capacities.

The Galion Allsteel Body Co., Galion, Ohio, has appointed Acme Spring & Equipment Co., 626 Maryland Ave., Charleston, W. Va., as distributors of Galion products in central West Virginia.

Sales of Galion dump bodies and hydraulic hoists in the Charleston territory will be supervised by S. J. Kish, general manager and R. "Bob" Brown, sales manager.

Robert C. McDowell, president of McDowell Co., Inc., Cleveland, has announced the appointment of Harold E. Rowen as general manager of the firm's new Dwight-Lloyd Division.

Rowen was formerly vice-president of Sintering Machinery Corp. producer of Dwight-Lloyd sintering machines, all assets of which were recently acquired by McDowell.

John L. King, formerly with the T. R. Routh Co., which has served Electric Controller & Mfg. Co. in the San Francisco area, is joining the latter organization to operate a new office. This will be located at 530 El Camino Real, San Carlos, Calif.

Election of Harold M. Schudt as president, Canadian Allis-Chalmers Ltd., was recently announced. He replaces Mark C. Lowe who resigned after being president of Canadian Allis-Chalmers Ltd. since 1951 and affiliated with the company since 1947.

Lloyd Oliver has been named supervisor, mining sales, of the Carmet Division of Allegheny Ludlum Steel Corp.

Edwin T. Goree has been appointed assistant sales manager, Excavator Distributors, for Bucyrus-Erie Co., according to an announcement from the company's main office in South Milwaukee, Wis. Goree will assist R. C. Adams, recently named sales manager of Bucyrus-Erie's widespread distributor organization.

CATALOGS & BULLETINS

AIR CLASSIFIERS. *Hardinge Co., Inc., York, Pa.* Bulletin AH-467 describes the company's "Gyrotor" Air Classifier. The "Gyrotor" is a device for continuous separation of an airborne mixture of coarse and fine particles. It may be used as an independent sizing unit or in closed circuit with a grinding mill. Operating principles, typical applications, and different general arrangements are

CABLE VULCANIZERS. *Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.* Bulletin B48a outlines the company's line of cable vulcanizers and vulcanizing supplies. Information on molds vs. cable sizes, as well as a description of vulcanizing procedures, is also included.

MOTOR CATALOG. *General Electric Co., Schenectady 5, N. Y.* Bulletin GEC-1026 presents complete buying information on standard a-c fractional and integral horsepower motors in most general use. A special section on the selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types and selection of fuses and circuit breakers. Descriptions and specifications include single-phase, polyphase, totally enclosed fan cooled and gear-type integral horsepower motors.

PRECISION EQUIPMENT CATALOG. *Precision Equipment Co., 3666 Milwaukee Ave., Chicago 41.* The 16-page catalog outlines Precision's standard line

of lockers, ladders, steel shelving and storage and maintenance equipment for industrial and institutional uses.

ROTARY VACUUM FILTERS. *Filtration Engineers, Inc., 155 Oraton St., Newark 4, N. Y.* The principles of operation, performance characteristics and other technical details of continuous rotary vacuum filters with the Fine String Discharge are given in Bulletin No. 103-B. Horizontal rotary vacuum filters, scraper filters and synthetic filter fabrics are also briefly described.

TROLLEY LOCOMOTIVES. *Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago 9, Ill.* Catalog G-102 describes Goodman's line of trolley locomotives for main line haulage in coal mines. Locomotive specifications are given in detail and a description is made of construction features.

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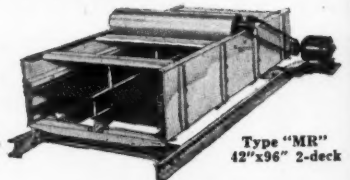
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Type "MR"
42"x96" 2-deck

UNIVERSAL VIBRATING SCREEN CO.

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Bottom-Dump Coal Haulers have capacities of 25, 32 and 40 tons... engines from 190 to 300 h.p.... dual or large single drive and trailer tires... torque converter and Torqmatic drive or standard transmission.

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

Higher Availability

More Tonnage

Lower Costs

On scores of mining operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the bituminous and anthracite fields. If you're interested in cutting your hauling cost for coal, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

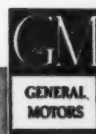


Rear-Dump models are available in 10, 15, 22, 34 and 50 ton capacities with engines of 165 to 600 h.p.... semi-rigid or spring mounted drive axles... standard transmissions or torque converters and Torqmatic drive.



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





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Pick any mining area in the country, and you'll find—in large mines and small mines—Edison Self-Service installations of miners' cap lamps delivering maximum economy and efficiency for the operator.

There are good reasons for this *continuing acceptance* of Edison Self-Service. The simplicity of the system, demonstrated in these many mines over the years, answers the need for effective, minimum cost lamproom procedure. Miners serve themselves . . . move in and out of the lamproom without waste motion. All-important too, is the quality construction and design of the Edison Lamp. This quality translates minimum lamproom care into maximum underground performance. Miners work better, and safer.

You can profit from our long experience in Self-Service. And remember, the Edison Lamp Rental Plan means you can have Edison dependability without a major initial investment. We'll be happy to fill in the details. Write or call.



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